MAY 25, 1924

THE RUBBER AGE

VOL. XV. NO. 4

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THE RUBBER AGE

The Only Twice-a-Month Rubber Publication

VOL. XV. MAY 25, 1924 No. 4

RUBBER A BIG FEATURE OF EMPIRE EXHIBITION

Rubber Displays Seen Not Only in Manufacturers' Sections but as Part of Decorative Effect—American Goods Attract Interest

(Special to THE RUBBER AGE*)*

After careful consideration of all existing records relating to previous world expositions, the authorities responsible for the Empire Exhibition opened recently at Wembley Park, London, (Eng.) have felt fully justified in their decision to call it the greatest exhibition ever held. The Exhibition has all the educational value of a tour round the world, for the methods of five continents and of all the races of men applied industrially and scientifically, are shown side by side. Before explaining that section which necessarily is of greatest interest to rubber men, a few facts about this Exhibition generally should, in view of its unprecedented international importance, be of considerable value.

Covering an area of 220 acres, its cost complete will very closely approach the two and a quarter hundred million dollar mark. It is expected to be visited by at least thirty million people during the six months it will remain open. Five railways run into the grounds and there are over fifteen miles of roads in the Exhibition. At one end of the grounds has been erected the world's largest stadium with 40 miles of terraces and seating accommodation for 125,000 spectators. No less than 1,500,000 rivets have been used in its construction. The largest bandstand has an enclosure of 10,000 seats with 3,000 more seats outside. The Amusement Park has a theater and dance hall said to be twice the size of any other in existence. Illumination is provided by over one million lights. The two largest buildings are the Palaces of Engineering and Industry. The former, extending over half a million square feet—practically ten acres of solid machinery exhibits—stands today as the largest building in the world of ferro-concrete construction, while the latter is almost as large. It is in these two imposing edifices that the principal displays of the rubber industry are housed. Some of the largest locomotives yet constructed and huge naval guns exhibited in the Palace of Engineering weigh over 150 tons. Five railway bays were provided inside this hall for the transhipment of exhibits directly to and from their beds.

From the above facts it will be seen that in a show of such magnitude the rubber industry was, in preparing a suitable display, up against a very considerable problem. Bearing in mind the supreme importance of their product, rubber men knew that anything ordinarily considered to be on a large scale would, in such an exhibition as this, be dwarfed in a like manner to Gulliver in

(Continued on Page 126)

RUBBER STOCKS' DECLINE

On May 1 last one share of common stock of each of seven rubber companies listed on the New York Stock Exchange could have been bought for a sum less than $91. Not a great while ago, quotations of these identical stocks aggregated over $600. Not one of the seven stocks listed below are paying dividends on common shares. Final quotations of the common stock of these companies on May 1 were:

Ajax	5 1-2
Fisk	6 5-8
Goodrich	20 5-8
Kelly-Springfield	16
Keystone	1 3-4
Lee	10
U. S. Rubber	30 1-8
Total	90 7-8

International Newsreel

Examining Rubber Paving

Clarence Wright (in center) and Comm. Joseph A. Rourke (at right)

STRETCH OF RUBBER PAVING LAID IN BOSTON

Clarence Wright of Wright Rubber Products Co. and City Officials Assist in Laying First Slab on Northern Ave. Bridge

At last an American city has taken up the question of rubber paving in a practical way. Rubber streets became a reality in Boston, Mass., on May 7 when Commissioner of Public Works Joseph A. Rourke, Street Commissioner John H. L. Noyes and Clarence Wright, president of the Wright Rubber Products Co., Racine, Wis., assisted in laying the first slab of rubber paving on the Northern Avenue Bridge.

The decision of Boston officials to lay an experimental section of 36 square feet was largely due to the co-operation of Mr. Wright and Day Baker, chairman of the Legislative Committee of the Massachusetts Automobile Dealer & Garage Association, who has been studying the possibilites of rubber paving for over two years. Mr. Wright supplied the necessary paving, which is of a type invented by him and which was manufactured in his plant at Racine, without cost to the City of Boston.

The site selected for the experiment on the draw of the Northern Avenue Bridge carries unusually heavy traffic of both horse-drawn and motor-driven types. Planking used on this draw has to be frequently renewed.

The Wright pavement is in blocks, 12 x 6 inches and one inch thick and has an interlocking device by means of which it was fixed to the planking. The old planking on the section of the bridge subjected to the test was ripped up, new planking was put down, and after being coated with a special cement the blocks were nailed into place through the projecting tabs shown in the illustration produced herewith. When completed no nails were visible and the blocks presented a smooth surface which was declared by city officials to be equal in appearance to any paving in Boston.

The blocks are made from a formula in which approximately one-third plantation rubber is used. In curing, the blocks are subjected to a temperature of 333 degrees while under a pressure of 2500 pounds.

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RUBBER A BIG FEATURE OF EMPIRE EXHIBITION

(Continued from Page 125)

Brobdingnag. To be in proportion with the displays of other industries they had to prepare an exhibit surpassing all previous ones in its comprehensive exposition of the many-fold uses rubber finds today in every trade of importance. That they have succeeded in this super task is best testified to by the crowds that throng the display incessantly. Fully 100,000 people a day since the opening have viewed the spectacular rubber section and the authorities believe this number will gradually increase until it almost doubles before the exhibition's close.

Every separate department of this vast show may be truthfully described as an exhibition within an exhibition. The rubber is in itself a larger, more artistic, and in every way greater display than any previous exhibition exclusively devoted to rubber. So largely does the use of rubber enter into every trade that it was found impossible to confine its exhibit to any special section. Consequently, manufacturers who specialize in the requirements of individual trades have exhibits in their particular sections besides contributing to the splendor of the huge general display. In fact, no matter what part of these 220 acres one finds himself in, he is sure to be confronted by some tangible proof of the ubiquity of rubber and its indispensability to the needs of modern times.

Entering the Palace of Industry, we find the most important exhibit well situated adjacent to the eastern entrance. It is entered through an imposing portico flanked by rubber trees and is of decidedly unique design. A clear vista of the 6,000 square feet occupied is available. Great care has been taken to afford visitors a comprehensive survey of the infinite variety of goods manufactured from rubber. The contribution of rubber to the amenities of the home in the shape of flooring, tiling, mats, beds, etc., is available for inspection in such profusion as to make excusable the conception of a future "all rubber" house. Rubber as an indispensable adjunct to modern transport is illustrated in an excellent display of tires both pneumatic and otherwise, brake hose, buffer springs, etc., all of which are indicative of the potential part it plays as one of the essentials of advanced civilization. The surgical side of the industry is also well represented by firms whose experience goes back to the establishment of the business and who, throughout their long careers, have maintained unequalled reputations for quality.

It is in sporting goods, however, that the British rubber trade shines brightest. Here it has reached as highly developed a state of perfection as the tire industry in America. The manufacturers have to cater to a great sporting nation; their public is probably the most critical in the world, who demand the best and will take no substitutes. Consequently, to satisfy this demand for the highest quality, the makers have, through a hundred years of incessant scientific research work, contrived to produce goods of the highest attainable excellence.

In the Palace of Engineering, ten firms are exhibiting in the automotive section, a score or more in the electrical section, and about a dozen large manufacturers in the general engineering section. In the first of these categories a fine display of American manufactures are to be seen, displayed through their Canadian branches. In the second, a very extensive exhibit has been organized by specialists in the manufacture of cables and electric insulating material, while the third covers a very miscellaneous ground, dealing principally with supplies needed by large industrial plants.

The waterproofing industry also covers a large field, for in addition to ordinary waterproof garments, waterproof fabrics are displayed for 101 uses. In the toy section there is a complete range of balls, water toys, sponge products, etc. The miscellaneous section covers oilskin manufactures, vulcanite products, and a host of other necessities of modern life.

Only provedly excellent firms are exhibiting, their average age being just sixty years. Under the supervision of the well-known London architect, Mr. P. Morley Horden, the rubber manufacturing section, from the Malayan native hut-stall of the Rubber Growers' Association to the ultra modern displays of highly finished products of the oldest established concerns, provides a study of harmony and contrast arresting in its unusualness. From the standpoint of setting, artistry of design and color, and variety of products exhibited, this section may be judged one of the finest of many fine sights in the Palace of Industry. But the visitor who would see and learn all there is to know about rubber must not be satisfied by seeing this and the four other special sections; he must visit everyone of the score or more buildings composing this mammoth exhibition in order to appreciate rubber's great part in modern industry.

Although accustomed as the public is to its 1,001 applications in tires, sports goods, waterproofings, toys, etc., when compared with rubber's capacity for service in every phase of life, it may be said to be almost unknown. The world output in 1910 was 120,380 tons; in 1923 it was 411,361 tons. The eloquence of such figures and the unlimited possibilities presented by the wholly excellent display at the present Exhibition seem only to point in one direction—that we are upon the threshold of a "rubber age."

MECHANICAL ENGINEERS TO VISIT AKRON TIRE PLANTS

A feature of the Spring Meeting of the American Society of Mechanical Engineers, which will be held in Cleveland, Ohio, May 26 to 29 inclusive, will be an excursion on the afternoon of May 27 to Akron where the mechanical engineers are to be conducted through several of the large rubber plants. The Society will hold a joint session with the A.S.T.M. May 29 on Properties of Materials at High and Low Temperatures.

IRA A. WORTHINGTON DROWNED IN SOUND

Body Washed Up on Long Beach, L. I. Following Gale—Was New York Sales Manager of Armstrong Rubber Co. for Two Years.

Ira A. Worthington, New York Sales Manager of the Armstrong Rubber Co., of West Haven, Conn., was drowned off Long Beach, L. I. on May 13 while attempting to reach shore in a rowboat.

Mr. Worthington, who was forty years old, lived at 366 East 28th St., Brooklyn, N. Y. and had a summer home at Baldwin, L I. On Sunday, May 11, he bought a new 40-ft. motor boat at Poughkeepsie, N. Y. and brought it down the Hudson and to a Brooklyn boathouse with the aid of a friend. He left the boat at Brooklyn for the night and early the next morning left in it for Baldwin.

Caught in a gale, it is believed that he dropped anchor off Long Beach and attempted to reach shore in a small tender. This tender is believed to have been capsized by the heavy seas, and as Mr. Worthington was clad in army breeches and puttees, he was unable to swim ashore through the breakers.

After remaining up all night at Baldwin with their five-year old daughter, Lucille, Mrs. Worthington notified the police of her fears. A search was begun and the rubber man's body was found at the foot of Roosevelt Boulevard. Near it lay the rowboat that had been washed ashore bottomside up. The new motorboat was moored 500 feet out in the Sound.

Mr. Worthington joined the Armstrong Rubber Co. as New York sales manager about two years ago. He had previously been associated with the Trent Rubber Co., Trenton, N. J.

Many of his business associates attended the funeral which was held from his Brooklyn residence on May 14.

Goodrich Buys English Company

The B. F. Goodrich Co. recently completed negotiations for the purchase of the Ajax Rubber Works, Leyland, Lancashire, England, which were begun by President B. F. Work when he visited England some weeks ago. The production of tires and mechanical goods will soon be under way. The purchase includes the sole right to make pneumatic and solid Wood-Milne tires. It is said that $250,000 may be spent in installing additional equipment in the plant, which was bought to meet a growing demand in Great Britain for English-made products.

U. S. Rubber Buys Buildings

It was recently announced that the United States Rubber Co. had bought three five-story buildings at 62-66 Thomas St. near west Broadway, New York City, occupying a plot measuring 75 by 100 feet. The property will be used for warehouse purposes, it was intimated.

STRETCH OF RUBBER PAVING LAID IN BOSTON

(Continued from Page 125)

City engineers intimated that if the paving meets with their approval it will probably be used to cover the Warren Avenue Bridge which is said to require resurfacing three times a year. The Boston budget sets aside an appropriation of $100,000 for rubber streets. Although the cost of rubber paving of the type laid, is said to be three times that of wood blocks, city officials undoubtedly will not be influenced by this factor in view of its numerous other advantages that are well known to those in the industry. City engineers are convinced that in the long run the use of rubber paving will effect a considerable saving.

Northern Ave. Bridge Laying "Gang"

Clarence Wright (second from right) with Workmen. A Section of the New Rubber Paving is Visible in the Foreground.

BOSTON, MASS., May 14, 1924.—The second section of Rubber Street Pavement was laid today on Northern Avenue, near the center of the draw bridge, where it is thought that the most severe horse-drawn and motor truck conditions exist. At this point approximately one thousand vehicles pass each hour in each direction. The first section of the road was laid on Wednesday, May seventh, the first rubber block being laid by Joseph A. Rourke, Commissioner of Public Works, of the City of Boston, the second block by Clarence Wright, President of the Wright Rubber Products Company, Racine, Wisconsin, and the third block by Day Baker, Chairman of the Legislative Committee of the Massachusetts Automobile Dealer and Garage Association, who for the past three years has been urging the use of rubber for street and bridge pavement—and who discovered that the Wright company possessed a patent which would make rubber blocks practical.

The rubber pavement laid on the Northern Avenue Bridge consists of blocks six by twelve inches and one inch thick. The great difficulty in the way of success of rubber block pavement has been the inability to keep the blocks down, and to prevent them from creeping. Cementing to the foundation would not accomplish the result. The Wright blocks are constructed with two semi-circular flaps on one side and one flap on one end of the base of the block, which fit into corresponding recesses in the base of the adjoining block. Drive spikes are driven through holes in the flaps into the bridge flooring, or the special device used for concrete road foundations. The blocks are laid in hot rubberized cement, uniting the blocks together and to the foundation, making a water-tight roadway over the street or bridge foundation.

The speed and accuracy with which this rubber pavement may be laid was shown by a crew of four bridge mechanics, a cement pourer, cement layer, paving block placer and a spiker, who laid the first few hundred at the rate of sixty square feet per hour.

The first section of rubber pavement laid has been in constant use for nearly a week, and much to the surprise of all observers, the sharpest horseshoe calks or the heavy steel tires make no scratch or mark on the pavement.

International Newsreel

Laying Rubber Blocks

Comm. Joseph A. Rourke Laying the First Wright Block on Northern Ave. Bridge while Mr. Wright Watches

PHILIPPINES SUITABLE FOR RUBBER CULTURE

United States Department of Agriculture Expert Recently Returned from Expedition States Vast Tracts are Suitable for Production of a Good Grade

Announcement was made May 11 by the Department of Agriculture that vast tracts of land in the Philippine Islands have been found where the soil is well adapted for rubber production. For the last year experts of the Departments of Agriculture and of Commerce have been working under the $500,000 Congressional appropriation in the Philippines and in South and Central America to find areas suitable for the production of rubber in order to make the United States independent of the United Kingdom and other countries for its crude rubber supply.

These tracts have been located on territory within the possessions of the United States Government by a party of investigators sent to the Orient by the Department of Commerce, according to Mark Baldwin of the United States Department of Agriculture, who has just returned with the expedition which he accompanied in the capacity of soil expert. These lands now growing native grasses and timber are located on the Island of Mindanao, in the southernmost large island of the Philippines, and adjacent smaller islands. The island of Mindanao alone has an area equal to that of the state of Indiana, but its fertility and extent have not been appreciated.

Nearly 80 per cent of the rubber produced in the world is consumed in the United States and, so far as is known, practically all is grown within 15° latitude of the equator. The possession of this territory within the climatic range of possible rubber production offers an opportunity for United States capital to engage in one of the most important industries in territory within the restrictions of our own Government.

At present there are three producing plantations on the small island of Basilan and one in the interior of Mindanao. The largest plantation of the three consists of 180,000 trees. Ordinarily plantations can be brought to the tapping age in about five years. The oldest rubber tree on the island dates back to a small planting made about 17 years ago.

Speaking of the character of these soils, Mr. Baldwin said, "there are on these and adjacent islands large bodies of land well adapted to the growing of rubber trees, and there is much direct evidence of this fact. Although rubber trees will grow on a wide range of soils they make a better growth on the richer soils, and these soils in question are more fertile than much land in the Malay peninsula and Sumatra where rubber is now grown extensively."

On these islands, he said, there are soils very similar in superficial appearance to the good soils of the Corn Belt. He reports one instance of a homesteader who has developed a good corn farm on

(Continued on Page 129)

RESULTS OF R. A. TIRE DEALERS' STOCK SURVEY

Rubber Association Compiles Preliminary Data from Over 20,000 Replies—56.2% of Dealers Reported Inventory of Less than 50 Tires

The results of the questionnaire, which the Rubber Association of America sent in March to 147,898 tire dealers throughout the country in order to get authentic information as to the stocks of pneumatic and solid tires on hand, have been compiled in a table that is published herewith.

This table represents a preliminary report. Interesting and valuable comment received from the tire dealers will be collated in the near future for the use of members of the Tire Division. At that time the dealers will be classified to show how many sell gas, oil, accessories, hardware, etc., and with how many dealers tires constitute the principal article of sale.

Total responses to the questionnaire at this writing are 22,221, but considering the fact that 3,909, or 17.59% of those responding reported that they were no longer in the tire business, the "live" list was reduced to 121,883 dealers who returned usable responses to the number of 17,797. This represents 14.6% of the "live" total list. 56.2% of the dealers reported an inventory of less than 50 casings; 23.5% between 50 and 100 casings; 11.8% between 100 and 200 casings; 3.7% between 200 and 300 casings; 1.6% between 300 and 400 casings; 2.4% between 400 and 1000 casings; and 8% over 1,000 casings.

Responses were analyzed to show how representative were the total replies, so that the Rubber Association might know whether there was a sound basis for considering the data as a 100% condition. The results of this analysis showed that the response was thoroughly representative and the table published on this page shows the actual figures received by the Association built up to a 100% figure.

AWARD TWO AKRON RUBBER FELLOWSHIPS

Harry W. Howard, Illinois College, Jacksonville, Ill., '24, has been awarded the Goodyear fellowship in rubber chemistry at Akron University, Akron, Ohio. Lowell B. Cramer, a graduate of Cornell College, Mt. Union, Iowa, and now taking a post graduate course at Syracuse University, is the recipient of the Firestone fellowship in the same work. Both students will enter Akron University in the fall. These fellowships, which are open to graduates of all standard American colleges and relieve the student of the payment of all tuition fees, are worth $500 a year.

GOODYEAR SUES ON PATENT OWNERSHIP

Suit to Determine Patent Right to Rubber Heel Disc is Begun in Akron Court of Common Pleas Against Alois Schonenberger

A suit to determine the ownership of a patent right on a machine to distribute the small metal discs that are imbedded in rubber heels was begun recently before Judge E. D. Fritch in Common Pleas Court in Akron, Ohio, by the Goodyear Tire & Rubber Co. against Alois Schonenberger.

The tiny disc, which is one-quarter of an inch in diameter and very thin, is used in rubber heels to prevent the nail which holds the heel to the leather from pulling through the resilient rubber. In manufacturing the heels these discs were formerly distributed by hand into the molding machines. Mr. Schonenberger invented a device for the mechanical distribution of the discs.

Right to the patent is claimed by the Goodyear company because Schonenberger was employed in the plant to work out a plan for the mechanical distribution of the discs, the plaintiffs allege. The defendant maintains that he was not employed for any such purpose but worked in the plant like any other employee. While employed there, he

(Continued on Page 129)

Tire Stocks as Developed by the Rubber Association Dealer's Questionnaire

ARRANGED BY STATES

	AUTO REGISTRATION		DEALER MAILINGS		DEALER RETURNS		REPORTED INVENTORY — As of April 1, 1924					COMPUTED 100% INVENTORY — As of April 1, 1924			
STATES	Number	per cent to Total	Number	per cent to Total	Number	Total per cent Returns	per cent to Mailing	Casings	Tubes	Solids	Cushions	Casings	Tubes	Solids	Cushions
Ala.	114,768	.9	1,384	.94	147	.88	13.71	16,562	23,503	184	116	120,737	171,337	1,341	846
Ariz.	41,894	.33	488	.33	87	.41	17.40	7,390	9,719	126	9	42,493	55,884	725	52
Ark.	93,175	.73	2,168	1.46	191	1.26	12.44	10,487	16,046	87	89	84,315	129,010	699	716
Cal.	964,292	7.55	7,885	5.33	964	5.37	14.73	99,286	128,430	14,319	842	674,152	872,040	97,226	5,717
Col.	160,513	1.26	2,220	1.5	341	1.7	16.45	25,984	36,518	264	189	157,983	222,029	1,605	1,149
Conn.	149,927	1.17	1,661	1.12	181	1.07	13.88	17,231	21,877	840	175	124,063	157,514	6,048	1,260
Del.	26,542	.21	653	.41	36	.32	9.23	2,525	5,065	78	27	27,346	54,854	845	292
D. of C.	59,278	.46	—	—	24	.13	15.19	1,352	2,589	33	6	8,896	17,036	217	39
Fla.	129,792	1.01	1,618	1.09	187	1.07	14.34	19,016	26,191	108	66	132,542	182,551	753	460
Georgia	158,631	1.24	3,189	2.15	241	1.75	11.30	29,227	40,855	233	155	258,659	361,567	2,062	1,372
Idaho	53,211	.42	643	.44	111	.53	17.18	6,897	9,636	205	157	40,141	56,082	1,193	914
Ill.	810,061	6.35	7,990	5.4	895	5.21	14.09	80,197	126,716	1,817	453	569,399	899,684	12,901	3,216
Ind.	496,185	3.88	5,371	3.63	623	3.56	14.36	58,719	71,926	902	723	408,684	500,605	6,278	5,032
Iowa	507,214	3.97	5,161	3.49	681	3.66	15.26	52,226	81,473	173	257	342,080	533,648	1,133	1,683
Kan.	322,665	2.52	4,807	3.25	659	3.47	15.58	45,670	76,317	544	156	293,201	489,955	3,492	1,002
Kentucky	163,846	1.28	2,053	1.39	204	1.27	13.18	23,082	35,242	530	189	174,962	267,134	4,017	1,433
La.	101,544	.79	1,896	1.28	143	1.04	11.28	12,714	25,076	629	76	112,646	222,173	5,573	673
Maine	91,862	.72	1,788	1.21	241	1.28	15.45	15,138	19,572	138	65	97,943	126,631	893	421
Maryland	133,575	1.05	1,638	1.11	183	1.07	14.03	16,909	28,011	204	76	120,561	199,718	1,455	542
Mass.	418,792	3.28	4,288	2.9	447	2.7	13.58	53,930	87,818	2,008	629	396,925	646,340	14,779	4,629
Mich.	618,215	4.84	4,922	3.33	589	3.32	14.55	79,381	91,317	3,704	333	545,347	627,348	25,446	2,288
Minn.	433,287	3.39	6,382	4.32	665	4.03	13.54	59,273	97,107	704	308	437,435	716,650	5,196	2,273
Miss.	81,770	.64	1,964	1.33	157	1.1	11.71	9,354	18,032	223	32	79,883	153,993	1,904	273
Missouri	399,924	3.13	5,815	3.93	587	3.61	13.34	86 809	107,096	631	127	650,199	802,149	4,726	951
Mont.	63,140	.49	1,140	.77	236	1.05	18.44	18,200	23,534	264	67	98,644	127,554	1,431	363
Neb.	253,770	1.99	2,966	2.	400	2.13	15.40	37,248	53,596	301	286	241,740	347,838	1,953	1,856
Nevada	12,625	.1	245	.17	33	.18	15.07	2,003	3,060	46	7	13,280	20,288	305	46
New Hamp.	50,864	.4	867	.59	139	.69	16.52	9,439	15,131	161	66	57,106	91,543	974	399
N. J.	335,042	2.62	2,714	1.84	316	1.81	14.32	29,635	45,859	610	265	206,852	320,096	4,258	1,850
New Mexico	30,274	.23	818	.55	126	.63	16.40	5,859	9,390	784	64	35,740	57,279	4,782	390
N. Y.	938,679	7.35	10,254	6.93	1,274	7.04	14.84	149,613	197,309	4,108	1,224	1,008,392	1,329,862	27,688	8,250
N. C.	184,704	1.45	2,345	1.59	241	1.47	13.45	24,304	30,974	362	147	173,149	230,137	2,690	1,092
N. Dakota	99,685	.78	2,143	1.45	303	1.57	15.83	14,901	24,991	12	186	94,174	157,943	76	929
Ohio	965,490	7.56	8,127	5.5	941	5.39	14.32	97,592	131,071	1,494	681	681,192	914,876	10,428	4,753
Okla.	223,221	1.75	3,494	2.36	382	2.25	13.93	26,405	46,703	489	108	189,588	335,328	3,511	775
Oregon	136,280	1.07	1,456	.98	231	1.14	16.63	46,305	46,378	769	220	278,293	278,732	4,622	1,322
Penna.	909,818	7.12	10,306	6.97	1,327	7.21	15.10	103,647	176,146	2,877	870	696,143	1,166,087	19,046	5,759
R. I.	63,694	.5	607	.41	69	.4	14.14	5,644	7,911	20	4	39,903	55,931	141	28
S. C.	100,551	.79	1,899	1.28	176	1.13	12.78	10,018	13,537	93	181	67,722	91,510	629	1,224
S. Dakota	115,469	.9	2,051	1.39	311	1.57	16.24	15,202	22,348	79	9	93,492	137,440	486	55
Tenn.	137,969	1.08	1,541	1.04	158	.97	13.37	22,124	35,792	1,038	167	165,488	267,724	7,764	1,249
Texas	563,020	4.4	6,473	4.38	774	4.37	14.53	68,948	114,710	465	626	474,362	789,205	3,199	4,307
Utah	52,026	.4	739	.5	103	.54	15.65	7,399	10,361	35	1	47,280	66,207	224	6
Vermont	43,295	.34	726	.49	129	.6	17.65	6,765	9,592	17	—	38,290	54,291	96	—
Virginia	172,969	1.35	2,702	1.83	349	1.89	15.15	29,353	57,663	566	195	193,730	380,576	3,736	1,287
Wash.	222,240	1.74	2,112	1.43	378	1.78	17.42	23,688	30,662	549	129	135,969	176,000	3,151	740
W. Va.	126,989	.99	1,386	.94	156	.91	14.07	10,904	17,009	253	78	77,418	120,764	1,796	554
Wis.	412,040	3.23	4,293	2.9	573	3.06	15.36	49,414	71,302	403	195	322,673	465,602	2,632	1,273
Wyoming	31,318	.25	510	.34	88	.41	17.60	6,024	7,635	24	5	34,216	49,857	222	33
TOTAL	2,776,135	100.	147,898	100.	17,797	100.	(Av.) 14,60	1,648,993	2,388,796	44,513	11,036	11,355,428	16,498,602	306,347	75,773

PHILIPPINES GOOD FOR RUBBER CULTURE

(Continued from Page 127)

the island and raises 250 to 300 bushels of corn per acre by putting in three or four crops a year. He does his farming with Indian cattle and carabaos.

Four different species of the rubber tree, the Ceara, Castilloa, Ficus, Hevea or Para, have been tried but all others have given way largely to the now popular Hevea. This plant at least in the Orient, is the only one to survive the process of elimination, being the most desirable in many respects.

The entire process of producing raw rubber and making it ready for shipment to the place of manufacture into other products is usually carried out on the plantation. The collection of the latex, or sap of the rubber tree, so named because of its similarity in appearance to milk, is done by stripping off a small section of the bark each day and gathering the "run" in cups about the size of an ordinary tea cup. The combined output from all the trees is taken to the vats on the plantation and coagulated by the addition of an acid, usually acetic acid. The product is a white elastic mass which is washed and then machined into long sheets and dried into a form called "crepe sheet" or smoked to form "smoked sheet." In this form it possesses most of the properties of rubber as we know it in the common rubber band. The sheets are than folded and packed for shipment. Although most of the product is marketed in this way, unprocessed latex is being shipped directly to the United States in tanks.

Mr. Baldwin brought back with him many samples of the various soils which he will classify after analyzing them for their chemical content.

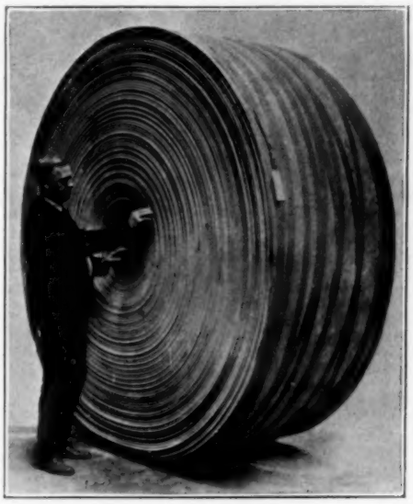
The island of Mindanao alone has enough suitable acreage to produce sufficient rubber for the requirements of the United States. It is out of the path of destructive typhoons. There are good deep-water harbors that may be developed into shipping points. By redistribution of labor, which the Philippine Government has already undertaken, enough labor may be secured to make the immigration of hands unnecessary, at least during the first years of the industry.

Only a little over 5 per cent of the Island of Mindanao is under cultivation of any kind. It is believed that with adequate capital Mindanao can be made to produce enormous quantities of raw materials. It is believed that the only factor that keeps American capitalists from considering the Philippines as a base for great rubber plantations is the indefinite political status of the possession.

Republic Produces Huge Belt

What is said to be one of the longest single belts ever manufactured for conveyor purposes was recently built and shipped by the Republic Rubber Co., Youngstown, Ohio. The belt was manufactured to order for use in conveying coke at a large western steel plant. It is 1,090 feet long, 36 inches wide, 7 x 6 ply, ½ inch thick, with 3/16 inch cover.

The belt is of step ply construction, built by means of a super-adhesion process, said to be a method used solely by the Republic Rubber Co. Approximately 2,300 square yards of belting was used



Two Tons of Gum Required

A Conveyor Belt Measuring 1,090 Feet—Built by the Republic Rubber Co. at Youngstown Plant

in its manufacture. The cover required about two tons of gum.

Fourteen operations over the building table were necessary in constructing this belt. When ready for shipment the belt stood 8 feet 4 inches high and weighed 10,700 pounds. An idea of its size may be gained by comparing the rolled belt with the man photographed beside it.

Yard Resigns from Pennsylvania

D. D. F. Yard has resigned as vice president of the Pennsylvania Rubber Company to become associated with Brandon, Gordon & Waddell in the sales department.

GOODYEAR SUES ON PATENT OWNERSHIP

(Continued from Page 128)

says, he conceived the idea and sought to patent a mechanical-distributing device as his own.

The court will be called upon to settle the question as to whether Schonenberger was a regular or special employee and to determine the ownership of the patent right for the distributing machine. Both sides admit that the litigation represents a large sum because over 600,000,000 of the small discs are estimated to be used annually in factories where rubber heels are manufactured. There are sixteen or more of the discs used in each pair of rubber heels.

Velveton Rubber Moves

The Velveton Rubber Corp. have announced their removal from 294 Ocean Ave., Jersey City, N. J. to 36-38 Hobson Ave., Laurel Hill, Long Island, N. Y. They have built a new factory and installed new equipment.

Wright Rubber Elects

At the annual meeting of the board of the Wright Rubber Products Co., Racine, Wis., Clarence Wright was re-elected president and Leon Healy, former secretary and treasurer, was made vice-president. Harold M. Koelbel, an attorney on the board, was elected secretary and treasurer. In addition to the officers, the board of directors is composed of Fred Tecktonious, Herbert Johnson, James Rohan, George Kamm and A. Durner.

A few days after the meeting Mr. Wright left Racine to go to Boston where he assisted in laying sections of rubber paving on the Northern Avenue Bridge. The St. Paul railroad is considering the advisability of using rubber pavement at two crossings because of the satisfaction given by the pavement laid at the Main St. crossing over eight months ago. It is said that the Wright Rubber Products Co. recently placed a bid on 100,000 square feet of rubber flooring for the Federal Reserve bank in St. Louis.

The Second Installment
of DUBOSC'S series on ACCELERATORS
appears in this issue.

Every chemist interested in the latest developments in rubber accelerators should read this valuable series of articles. Andre Dubosc, the author, is well known as the leading rubber chemist in Europe, which in itself guarantees the high character of this latest series on *Accelerators*. These articles will later be incorporated into book form.

And remember, Andre Dubosc is writing these articles exclusively for THE RUBBER AGE.

BINNEY & SMITH OPEN NEW COMPOUNDING LABORATORY

The Binney & Smith Co. has established a rubber compounding and testing shop in connection with their rubber development department. The shop, which is now operating, is fully equipped for compounding, vulcanizing and testing all lines of rubber goods, and is conveniently located in Long Island City, N. Y. within the Metropolitan district.

In planning this installation, the experimental requirements of the rubber manufacturer have been kept uppermost in mind. Researches connected with Micronex compounding and the general problem of rubber re-enforcement, theoretical as well as practical, will be undertaken, but primarily, it is a rubber compounding shop.

Laboratory size rubber machinery of the latest type and most approved design has been installed throughout. The mixing mill is equipped with a simple reversible electric switch safety device, which will not merely stop the machine, but which instantly reverses same, automatically disengaging and releasing anything caught between the rolls. Machinery and equipment has been designed to follow the testing procedures recommended in the recent report of the Physical Testing Committee, of the Rubber Division, of the American Chemical Society.

A Scott vertical rubber tester, used in the laboratory, was especially designed for the Binney & Smith Co. This machine was built primarily to determine the stress-strain curve of rubber stocks and is equipped with an electrically operated automatic load recording device, which makes possible accurate and efficient use of the machine by one operator only. To obtain the highest possible degree of accuracy and yet have a range high enough to accommodate Micronex stocks testing for break in the four to five thousand pound ranges, the dial capacity has been set at 150 lb., the gage of the test piece being held in the neighborhood of 0.080′.

In addition to the regular service and research work which is being conducted by D. F. Cranor of the Binney & Smith Co., the facilities of the laboratory are open to any rubber manufacturer who may desire to employ them.

Buffalo Goodrich Branch Moves

The Buffalo, New York, branch of the B. F. Goodrich Co. recently removed from 1052 Main St. to the Larkin Terminal Warehouse on Van Rensselaer, where, said T. E. Smith, branch manager, they will be in a better position to care for the needs of the many retailers served.

Goodyear to Sell Cotton Land

Cotton plantations in Arizona comprising 50,000 acres or more owned by the Goodyear Tire & Rubber Co., will soon be sold, according to an announcement made by officials recently. The decision to dispose of the Arizona holdings was taken after the refinancing program had been accepted. The land was bought in 1919 while Frank A. Seiberling was president of the company when rubber manufacturers faced a cotton shortage.

The desert land was irrigated and reclaimed; it is now said to be fertile and capable of producing good cotton. More than 20,000 bales were produced there one year. In addition to reclaiming the land, the company built two towns, Goodyear and Litchfield. It is expected that these will be retained, officials said.

Pettingell Promoted by Lee

The promotion of H. L. Pettingell to the post of direct assistant to Harry E. Field, general sales manager of the Lee

H. L. Pettingell

Tire & Rubber Co. was recently announced. Mr. Pettingell had been a district manager of the Lee Company devoting particular effort to the building up of the New York City branch where in the face of intense competition he built up an imposing clientele. Since he first entered business he has been in the closest contact with buyers and sellers.

In 1912 Mr. Pettingell first called H. E. Field his boss. In those days Mr. Field was with the Kelly-Field Co. who then held the sales franchise for Lee tires. At the outbreak of the war Mr. Pettingell enlisted as a private and was discharged a First Lieutenant having participated with distinction with the 9th Regular Infantry, 2nd Division. He was in four major engagements, — Chateau Thierry, Soissons, Saint Mihiel and the Argonne Forest. He has two army citations, and the Croix de Guerre with one palm. He is now a member of of the Reserve Corps attached to headquarters of the 77th Division. After his discharge Mr. Pettingell returned to the Lee Company as a special representative and subsequently a district manager which position he has held up to the time of his promotion.

THE MARKET PLACE
Opens Soon !

FIRESTONE SALESMEN CONVENE IN AKRON

Between 750 and 800 salesmen and branch managers of the Firestone Tire & Rubber Co. arrived in Akron, May 13 from all sections of the United States, for a four-day salesmen's conference to be held at the Firestone plants.

Representatives were also there from the Firestone factory in Canada and the branch in London, England.

The special trains were run to the Firestone factories, where the men left their Pullmans, going directly to the plant, while motor trucks transported their baggage to hotels.

This is said to be one of the largest sales conferences ever held in Akron. Group meetings were held daily under the direction of the various divisional sales managers, the sessions addressed by men experienced in the various phases of tire and rim construction.

The delegation was divided into parties of 25 each for a tour of the tire and rim plants.

Several entertainment features were a feature and a banquet was given May 15. The salesmen were entertained at the Shriners' carnival at Summit Beach Park May 14.

Many of the salesmen never saw the various processes through which an automobile tire passes in its construction and were interested in seeing what has to be done to supply them with the product they are selling.

Soon after the arrival of the trains the salesmen congregated in the Firestone Clubhouse auditorium where they were greeted by John W. Thomas, vice president, who outlined the plans of the conference. H. S. Firestone, while addressing the salesmen said they were in one of the most important industries of the age.

RUBBER COMMITTEE OF SAFETY COUNCIL MEETS

At a meeting of the Executive Committee, Rubber Section, National Safety Council held in Akron, April 11 and 12, reports from various committee chairmen showed a great deal of activity and much progress made in many ways.

The Engineering Committee which was appointed at the last Annual Congress of the National Safety Council reported that they had been very busy with Mr. Leveridge of the New Jersey Department of Labor and Industries, drafting a code for the rubber industry in that state. This committee is composed of Mr. Blanchard, of Hood Rubber Co., Mr. Cordon, of U. S. Rubber Co., Mr. Cozzens, of American Hard Rubber Co., and Mr. Hoener, chairman, of Firestone Tire and Rubber Co.

Tentative plans were also made for the Rubber Section's program at the next Congress of the National Safety Council which is to be held in Louisville. These plans include a jiont session with the Chemical Section on Tuesday, reports from committees on Wednesday and Thursday, and addresses by prominent men in the industry on subjects of particular interest.

SOIL LIMITING FACTOR IN AMAZON RUBBER REGION

Dr. Curtis F. Marbut of the Bureau of Soils of the Department of Agriculture returned recently from an extended trip in South America where he was soil expert with the rubber investigation expedition sent out by the Department of Commerce. The expedition covered a large territory in the Amazon basin and the basins of a number of its tributaries as far as a short distance into Bolivia.

Although an enormous area in this region is adapted to rubber production so far as temperature and rainfall are concerned soil conditions, says Dr. Marbut, are the limiting factor. He says there is a noticeable difference between the soils of those parts where rubber grows and those where it does not grow and that there is also a noticeable difference in soils between those regions producing the highest quality of rubber and those producing rubber of poor quality. The rubber plant known as Hevea, which is the big rubber producer of this region, seems to grow best on a heavy red soil underlaid by an open subsoil which permits easy penetration by the long taproot of the plant.

After leaving the rubber investigation expedition Jan. 1, Dr. Marbut traveled extensively in other parts of Brazil and in Argentina making soil and geographic studies for the Department of Agriculture and the American Geographical Society. Among many other things he reports that cotton growing in the northeastern states of Brazil does not promise to be a very extensive industry because of soil limitation. The crop is grown only on narrow alluvial strips bordering the rivers, the higher back country not being suitable because of aridity and a subsoil of almost rocklike hardness. Only about 1/500 of the area of that region is suitable for cotton. The best coffee land of Brazil is a deep, blood--red, heavy clay derived from dark colored volcanic rock, a soil which may be described as "young" and which is very fertile.

Dr. Marbut traveled over large areas of Argentina and collected many soil samples which will be analyzed in the department's laboratory. The great central area of Argentina, he reports, is largely pasture land; alfalfa is grown to some extent but a very large proportion of the area is devoted to pasture, mostly native grass. This large region, says Dr. Marbut, will never be an important corn country because of the layer of heavy tough clay close to the surface.

New Erie Sales Manager

J. M. Dine, formerly vice president and sales manager of the Oldfield Tire Co., Akron, Ohio, and vice president and general manager of the Madison Tire & Rubber Co., Buffalo, N. Y., has become sales manager of the new Erie Rubber Corp. which recently purchased the plant, equipment and business of the Erie Tire & Rubber Co., Sandusky, Ohio. The Erie Corp. has begun production of balloon tires and has added a new cord tire, named "Sandusky" to its line. Mr. Dine recently stated that the future of the Erie corporation looks bright, that a satisfactory volume of orders is being booked, and that contracts have recently been placed by a number of large jobbers and distributors in the South and West.

RUBBER MICE BAIT

The statement that new and unusual uses of rubber are being discovered every day is almost literally true. Now comes forward H. H. Smith, Curator of Botany in the public museum at Milwaukee, Wis., to state that crude rubber is a far better bait for mouse traps than the famous and odoriferous Limburger!

Recently Mr. Smith received a sample of crude Chinese rubber from Akron for exhibition in the museum. Discovering that it resembled a certain cheese not only in appearance but in smell, he conceived the idea of utilizing it as a bait in mouse traps. It proved successful. The mice seemed to like it, judging from the numbers that were tempted to risk death for a nibble at the "delicious" tidbit. And the Chinese rubber has the advantage of being more permanent than the cheese bait.

Carew & Billhardt Moves

Carew & Billhardt, until recently located at 61 Whitehall St., New York City, are now at 25 Beaver St. New telephone numbers are Broad 6860, -61 and -62.

Steal $5,000 Crude Rubber

A large motor truck loaded with $5,000 worth of crude rubber was stolen recently from the garage of the Curran Automobile Transportation Co., 193 Seventh St., Brooklyn, New York, by four men who overpowered, bound and gagged the watchman. He was alone in the garage when two men came in to obtain gasoline for a car they said had stalled. While he was looking for a can they forced him to throw up his hands and left him helpless on the running board of a truck. The stolen truck was the property of the Louis C. Hopkins Co., 101 Water St.

Rubber City Centenary in 1925

Ex-mayors, newspaper editors, chamber of commerce officials, representatives of the Akron Merchants' Association and others met recently at Mayor D. C. Rybolt's office to discuss preliminary plans for a centenary celebration befitting the 100th birthday of Akron, Ohio, in 1925. The celebration is tentatively planned to last a week during which there will be parades, speeches, banquets, etc. All speeches given are to be published in book form for distribution. Prof. O. E. Olin and Judge R. C. Grant may be asked to collaborate on a history of the city. The recent meeting was a forerunner of others to be held during the summer and fall.

SEEK TIRE TESTING DATA FROM RUBBER EXECUTIVES

Representatives of the Indianapolis and Indiana chambers of commerce visited Akron, Ohio, recently for the purpose of obtaining information from large tire manufacturers as to the possible benefits to be derived from testing tires on the Indianapolis Speedway. Facts gathered are to be used at a testimonial dinner, preceding the Memorial Day race, May 30, according to W. L. Esterly. This race will mark the 15th anniversary of the establishment of the Speedway.

The Speedway was established in 1909 by James A. Allison, Carl Fisher and Arthur Newby. Since that time it has become internationally known. Drivers from all over the world have driven racing cars on the track.

Mr. Esterly and his party will seek interviews during the trip from H. S. Firestone, F. A. Seiberling and prominent officials of the Goodrich, United States, Goodyear and General companies as well as with executives of large automobile manufacturing companies.

American Zinc Appoints Agents

The American Zinc Sales Co., Columbus,, Ohio, announce, effective May 1st, 1924, the appointment of Martin, Hoyt & Milne, Inc., of San Francisco and Los Angeles, general sales agents for the Pacific Coast to handle the sale of AZO Brand zinc oxides. Warehouse stocks of these materials are being maintained at San Francisco and Los Angeles and the trade can be assured of an adequate stock at all times.

Tennessee Plant Destroyed

The plant of the Tennessee Rubber Co., manufacturers of boots and rubber bridles, situated on Vine St., Murfreesboro, Tenn., was almost completely gutted by fire recently. Only a portion of the office on the second floor front escaped serious damage. The fire was discovered at 9 p. m. in the rear of the factory. Before the firemen arrived it had spread to other sections of the plant. Loss is estimated at several thousand dollars.

Foreign Trade Meeting Slated

The annual meeting of the National Foreign Trade Council, which is to be held in Boston, Mass., June 4 to 6, inclusive, will give export managers and other executives of rubber companies the opportunity to become better acquainted with the Foreign trade promotion work of the Bureau of Foreign and Domestic Commerce.

According to Julius Klein, Director, the reorganized Bureau is made up of a number of commodity, technical and regional divisions in charge of experts in their particular fields. The chiefs of the commodity divisions, covering basic industries, including rubber, who number seventeen, are prepared to give expert advice to American manufacturers interested in selling their products abroad.

British Reaction to the Hoover Plan

English Crude Rubber Men Maintain that Prices are Not Under Control and that Stevenson Plan has had No Great Effect

(Special Correspondence to THE RUBBER AGE)

HERBERT HOOVER'S move to get Congress to bring certain foreign monopolies within the scope of the Webb-Pomerence Act, and his inclusion of crude rubber among such monopolies has had considerable repercussion on crude rubber interests in the United Kingdom. The said interests do not at all admit that Mr. Hoover is right in his premises, for while allowing that under the Stevenson restriction scheme the export of crude rubber from the Federated Malay States and Ceylon is restricted to a percentage of what is tabulated as the normal production of those countries—which percentage is at present set at 60—they point out that there is no price control. Crude rubber fetches what it is worth in the open market and is, at present, only at a fraction more than one shilling a pound. Nor can there be any effective control of the production with the estates in Java continually increasing their supply, the Dutch seeing the advantage of making hay while the sun shines and tapping the trees to the limit. Consequently it is argued that there is no control of rubber and that the effect of the Stevenson scheme has been simply to restrict the export of this commodity from the first two countries named.

Admit Stevenson Plan Ineffective

It is admitted on all sides here that the Stevenson restriction scheme has not been the success it was expected to be. With a sixty per cent export from Malaya and Ceylon the average price for the three months ending April 30 should be 1s. 3d.—on paper. But the spot market is just hovering round the shilling mark. If the average for the present three months had been below the shilling, the allowable export percentage would have been reduced to 55 for the quarter May-July. However we shall be saved that reduction.

Mr. Hoover's threat, combined with the failure of the restriction scheme, has set the rubber interests in London thinking out ways and means of forcing prices up to what they regard—looking at the matter solely from the viewpoint of the holders of shares in rubber estates—as a more reasonable standard and the interests of these people certainly do not coincide with those of the user of rubber. The movement in this direction is focussed in the Rubber Growers' Association, which numbers among its membership all the principal rubber-growing estate companies and most of the rubber "magnates" with which London abounds. The Association is now actively considering the best means to take to achieve the aforesaid end and favor is shown to some kind of co-operative selling scheme. The question of financing such a scheme is a difficult one. At present prices a ton of rubber is worth round about £120 and when you want to obtain some control of the market it is necessary to take up several tens of thousands of tons of the commodity. The financial side would perhaps not be difficult if there was any security that prices would not fall still lower, but even a drop of a penny in the lb. might cause cold feet, a scurry to unload, a market still further depressed and a very heavy eventual loss. However, it is to some such scheme that attention is now being turned and the Association has circularized its members to find out whether they in principle would be prepared to co-operate. The Council of the Association has expressed the opinion that it should be quite possible to carry such a scheme through and are appealing to the rubber interests to support it whole-heartedly. At present the number of sellers is legion, the number of buyers is restricted, producers sell just when it pleases them quite regardless of whether the main buyers are active or not, there is much speculation, and the whole selling end of the business (from the rubber-estate viewpoint) is unsound. If the rubber interests are prepared to support a cooperative selling scheme of this kind, crude rubber will be kept off the depressed and overstocked market until such time as the latter has again become capable of digesting it. Developments cannot fail to be interesting and it may come to pass that Mr. Hoover has done a good turn to the rubber growers without meaning to by scaring them into a cohesion which they have never possessed until now.

Of course, after all, restriction and cooperative selling schemes are not a real remedy for the low prices of the raw material; they can never be anything but a palliative. Although certain optimists insist that the demand will shortly exceed the supply under normal conditions of heightened demand, what really is needed is an increase in the number of uses to which rubber can be put. Certainly a good deal has been done in this direction by propaganda—witness the boom in crepe rubber soles—but much more will have to be done to make an appreciable effect. The market for crepe rubber soles can not, even allowing a wide extension, account for more than a few thousand tons of rubber per annum. Some method of using rubber in bulk must be found. Rubber roadways would appear a splendid absorbent of the product were it not for the high expense of their initial cost. The experimental stretch of rubber blocks laid in Whitehall, London, cost in the region of £5 per square yard including the necessary foundation, whereas the wooden blocks with which London's streets are paved can be laid for a third of this price. It is granted that the rubber blocks will last longer than the wooden ones but in these times first cost is a consideration and rubber is not likely to be used much for the purpose except in cases where expense is no object and reduction of traffic sounds is a desideratum. Rubber tiling, rubber rugs and carpeting, are increasingly used but what is wanted is a still larger use, such as in the frame of vehicles for shock absorbing purposes. Probably this will come soon as certain inventive minds have been wrestling with the problem.

What is a Fair Price ?

In the meantime the Rubber Growers' Association does its best to help the rubber-growers and the manufacturers by continual propaganda for a wider use of rubber. It has spent a large sum in this way during the past five years and is now appealing for donations and subscriptions of £40,000 per annum for the next five years to be spent on propaganda. And the industry is so important that doubtless the money will be forthcoming.

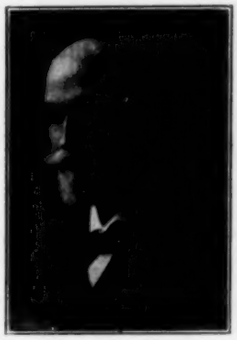
Every fair minded manufacturer will agree that the producing end of the industry should get a fair price for the raw product, though, from what one hears, there is a difference of opinion as to what such a fair price is. It would be bad policy to depress the producers so that they found it no longer profitable to produce and turned their attention to tea, quinine and other products. Live and let live should be the motto on both sides, each section of the industry helping the other to the fullest extent possible. Crude rubber must be industrially treated before it is saleable and this is where the manufacturer will score through its increased use. And London interests are not likely to be satisfied before they see the price reach 1s. 6d. a lb. again.

This Installment Discusses the Tests Made to Determine the Action of Resins and Proteins

Studies on the Vulcanization of Rubber – Chapter 1

(Continued from May 10 Issue)

By **Andre Dubosc**



Andre Dubosc

IN our last issue Mr. Dubosc took up the theory of vulcanization as given by Ostwald, Weber, Beadle, Stevens and others and in addition described a number of tests made to determine the coefficient of vulcanization. This installment discusses the results of these tests.—The Editor

Discussion of Results

In considering the results that are contained in the above tabulation, it is first advisable to take up the series of tests on insoluble matter which includes tests No. 1 to No. 11 inclusive.

As far as No. 2 is concerned the effect of the benzine is inappreciable. On the other hand mixture No. 3 gives a vulcanized rubber which does not possess the mechanical strength of the former samples. The coefficient of vulcanization in sample No. 3 is lower, being 2.68, and the physical properties of the vulcanized rubber are somewhat less favorable than what would be expected under the conditions.

Sample No. 4 which contains an excess of insoluble matter possesses a high coefficient of vulcanization, namely 3.62. It also resists rupture very well.

Sample No. 5, which is a pure rubber and does not contain any insoluble matter gives a vulcanized product which possesses just the opposite properties. Its resistance to rupture is low and the coefficient of vulcanization is similarly low.

No. 4 is over-vulcanized and No. 5 is under-vulcanized. Both samples are vulcanized under exactly similar conditions of temperature and duration of process. The results obtained in these tests show clearly just what effect the presence or absence of the insoluble matter has on the properties of the finished vulcanized rubber. The proteins and the resinous matter have a certain action on sulphur. As a result thereof suphuretted hydrogen is formed while the oxidized rubber gives rise to the formation of sulphurous acid, SO_2. These two sulphur compounds react with each other and result in the formation of colloidal sulphur, which is the one form of sulphur that is able to combine with the rubber molecule. Because of the fact that the rubber mixture contains certain insoluble matter, resinous substances, proteins as well as oxidized rubber itself, a certain proportion of the polymerized sulphur, whose molecule is composed of eight atoms of sulphur, is converted into colloidal sulphur. The rest of the polymerized sulphur remains in the rubber mixture in the state of non-combined sulphur after the vulcanization process.

Addition of Proteins of Foreign Origin

Rubber samples 7 and 8 contain proteins, which are not naturally found in the rubber gum and which have been artificially added to the rubber. These rubber samples have coefficients of vulcanization, which are greater than that in the case of sample number one, in which the rubber was not treated at all but vulcanized directly. The coefficients of vulcanization of samples 7 and 8 are 2.89 and 3.22 respectively, while that of mixture number one is only 2.86. In other words one is rather greater than the coefficient of sample number one, while the other is practically the same.

The increase in the coefficient of vulcanization, which is brought about by the incorporation of the peptone with the rubber, corresponded to a change in the physical properties of the rubber gum, which bears a very marked resemblance to the virgin rubber. Under actual practical conditions there is very little difference that can be noted between the physical properties of the vulcanized rubber samples number 1 and 7. These properties are retained by the vulcanized rubber as the samples age, and after a perid of six months has elapsed, samples number 6 and 7 become exactly similar in physical properties to sample number 1.

Application of the Vulcanization Theory

If the theory of vulcanization is assumed to be correct, as has been explained above, namely the formation of colloidal sulphur through the reaction between sulphuretted hydrogen and sulphur dioxide (sulphurous acid), the explanation of the results which were obtained in the above series of experiments is a simple matter. It is also then perfectly clear what role is played by the resinous ingredients of the rubber in the vulcanization of rubber. This also applied to the insoluble ingredients of the rubber gum.

The physical properties of the vulcanized product obtained from sample No. 8 which was prepared with the addition of casein show that the incorporation of nitrogenous constituents has not the same results and that the best results are obtained when peptones are mixed with the rubber. If a comparison is made between the results that are obtained with a rubber which has been freed of all its insoluble ingredients and those that are secured with a rubber to which casein has been added, it is easy to conclude that the casein has the effect of increasing the coefficient of vulcanization and of changing the physical properties of the vulcanized rubber. But this effect is rather less than is exerted by the addition of peptones.

Results with Rubber-Starch Mixture

The same results are obtained when rubber is mixed with starch, as is done in sample No. 9. But in this case the catalytic properties of the starch are still less powerful than those of the peptones, and hence the results are not so good as when casein is added.

If polymerized sulphur, S_4, is permitted to act on the peptones at a temperature which may vary between 120 and 150 degrees C, as well as on casein and starch, the following interesting and enlightening conclusions may be drawn in respect to the degree with which sulphuretted hydrogen is formed. When the reaction is allowed to proceed during the same period of time and at the same temperature the volume of sulphuretted hydrogen that is formed by the reaction between the added substance and sulphur is 3 in the case of the

peptones, 1.5 in the case of the casein and 0.5 in the case of the starch. In this fact is found the explanation of the difference in the quality of the finished, vulcanized rubber product that is obtained from the different rubber mixtures.

Results with Rubber Free from Insoluble Matter

In the case of sample No. 5, wherein a rubber is employed that has been freed of its insoluble ingredients, if the vulcanization is prolonged, the physical properties of the vulcanized product are improved and the coefficient of vulcanization is increased. This test was made with sample No. 11. The percentage of deformation of the vulcanized rubber was comparable with that obtained with the virgin gum in test number one. The percentage in the former case was 24 while that in the latter was 24.4. On the other hand the coefficient of vulcanization of the sample of rubber obtained from mixture number 11 was rather low and the resistance of the vulcanized rubber to rupture was also low, being only 198 grams per square centimeter.

Action of Prolonged Vulcanization

Hence it is clear that the results that are obtained when the vulcanization process is prolonged are not the same as those that are secured in a normal vulcanization of the virgin rubber. This difference is explained in the following manner.

In the absence of protein matter the conversion of polymerized sulphur into colloidal sulphur can be accomplished only by a partial decomposition of the rubber. This results in the formation of the hydrogen that is required to produce sulphuretted hydrogen by reaction with the sulphur. The hydrogen that is set free very likely comes from the methyl branched chain groups. A part of the normal isoprene rubber is converted into butadiene rubber, the properties of which are different from the former. If the results obtained with sample 11—rubber freed from its insoluble constituents—which is subjected to over-vulcanization are carefully studied, it is easy to see that when litharge is added to the rubber, it is possible to obtain a similar result when the vulcanization period is of normal duration.

The Action of Litharge

The removal of the protein ingredients of the rubber does not diminish the value of the vulcanized rubber, if litharge is substituted for them in the rubber mixture. From this fact Stevens has concluded that synthetic rubber, which does not contain any protein matter at all, can be perfectly vulcanized when litharge is added to the rubber mixture.

This is true but Stevens does not explain the same in any way.

On the other hand when the hypothesis, which has been developed and explained in this article, is utilized, then this phenomenon is readily enough explained in every respect. The insoluble matter is composed of proteins and oxidized rubber. The latter furnishes the oxygen which is required for the formation of sulphurous acid from sulphur. The proteins convert the sulphur into sulphuretted hydrogen. The two sulphur derivatives then react and produce colloidal sulphur which is required to carry out the vulcanization of the rubber.

If a rubber is being tested which contains its protein matter but from which the oxidized rubber has been removed, then it is found that the rubber vulcanizes very poorly. On the other hand if the same rubber is vulcanized after litharge has been incorporated with it, then the reaction at high temperature between the litharge and the polymerized sulphur yields sulphur dioxide as may be seen from the following equation:

$$16\ PbO + 3\ S_8 = 16\ PbS + 8\ SO_2.$$

The sulphur dioxide that is thus formed then reacts with the sulphuretted hydrogen derived from the reaction of sulphur with the protein matter in the rubber to give colloidal sulphur, which then accomplishes the vulcanization of the rubber by combining with it.

Furthermore the role that is played by the litharge can also be undertaken by such substances as magnesia, zinc oxide and the like, but for thermochemical reasons, litharge is preferred to these compounds. The following equations illustrate why this is so.

$$16\ PbO + 3\ S_8 = 16\ PbS + 8\ SO_2.$$
$$51 \qquad 16 \qquad 17.8 \times 16 \qquad 69.2 \times 8$$

816 calories which is less than 918 calories.

$$16\ MgO + 3\ S = 16\ MgS + 8\ SO_2$$
$$149 \times 16 \qquad 79.6 \times 16 \qquad 69.2 \times 8$$

2,284 calories are greater than 1906 calories

$$16\ ZnO + 3\ S_8 = 16\ ZnS + 8\ SO_2$$
$$86.4 \times 16 \qquad 43 \times 16 + 69.2 \times 8$$

1382 calories are greater than 1321 calories.

Discussion of the Thermal Equations

In the case of litharge, the thermal equation is positive. The reaction temperature is very low in this case, the reaction taking place even in the cold.

In the case of magnesia and the oxide of zinc the thermal equation is negative. Hence the reaction, which takes place between the oxides and the sulphur, can only occur when the temperature is raised to a point which is proportionate to the specific heats of the metallic oxides.

The influence which is exerted by litharge in the vulcanizing process is therefore explained very stisfactorily. Every metallic oxide which has a low heat of formation and which is capable of giving a sulphide by reaction with sulphur, which sulphide has a high heat of formation, will act in the same manner.

A study of the thermodynamic phenomena which take place during the process of vulcanization has, we believe, many surprises for the investigator and experimentor, but it results undoubtedly in the explanation of many conditions and circumstances surrounding the vulcanization process which have hitherto remained obscure and unexplained.

Effect of the Resinous Matter

The role that is played by the resinous substances in the vulcanization of rubber does not appear to the author to be of lesser importance than that played by the proteins and oxidized rubber.

Sample No. 12, which was a deresinified rubber, gives the same coefficient of vulcanization and the same physical constants of virgin rubber, but the resistance to breaking is superior to that of the virgin rubber. On the contrary the resistance of the rubber diminishes if there are added to a rubber, which has been deprived of its resinous content, resinous matters which are derived from a gum of the same nature and the tensile strength falls below that of aged rubber.

In fact the first and primary effect of the resinous matter in the rubber mixture is exactly a mechanical effect which is similar to that which is obtained when a softener is added to the gum, but this effect is produced only when the resinous matter is present in excess.

In small amounts and in the presence of sulphur and under the influence of heat the resinous matters first produce sulphuretted hydrogen gas which is required to effect good vulcanization. A pure rubber, to which resinous matters have been added, gives a coefficient of vulcanization of 3.12, which is greater than the coefficient of virgin rubber.

Effects of Addition of Various Resins

The resins that are derived from jelutong rubber, as is indicated in experiment number 11, give practically the same results as the resinous matters that are derived from Hevea rubber. Nevertheless, inasmuch as their pyrogenation demands a temperature which is higher than that which must be used with the Hevea resins, it becomes evident that they at the same time yield a lesser proportion of sulphuretted hydrogen, and as a direct result thereof, a smaller quantity of sulphur that can be assimilated by the rubber molecule.

In the case of rosin, which is covered in experiment No. 13, the coefficient of vulcanization goes back to normal, 2.89, but the addition of the rosin to the rubber mixture results in a reduction in the physical constants of the vulcanized product, and the rubber seems to be imperfectly vulcanized.

Sample No. 16, which is no different than sample No. 4, contains an excess of insoluble matters, but the resinous matter

In our next issue

In addition to his own theory on vulcanization, Mr. Dubosc starts a discussion on the theories of Payen, Hinzerlin, Unger, Seligmann, Otto Weber, Ostwald, Axelrod on Polymerization, Donath, Erdmann, Byson, Kindacher and Hinrischsen on Mixtures, Pellier, Victory Henry and Bysson, Bary and Weydert on Reversibility, Skellon on the Migration of Sulphur, Bernstein on Ultra Violet Rays, Lothar Weber, Van Rossem, Stevens.

With the next installment a detailed outline of the complete series of articles on Accelerators will be published. Briefly this includes chapters on Natural and Mineral Accelerators, Organic Accelerators, etc.

has been removed, as the rubber has been subjected to extraction with acetone. In comparing the physical constants that are obtained from the vulcanized rubber product derived from this sample with those that are secured with the vulcanizates from samples one and 12, it becomes evident that the resistance of the same to breaking has increased and that the coefficient of vulcanization has been augmented. This clearly demonstrates the influence of the insoluble matter, the proteins and the oxidized rubber on the results of vulcanization.

Results Obtained with the Other Samples

Sample No. 17 is an absolutely pure rubber and does not contain any insoluble matter, nor resinous matter. If sample No. 5 is compared with this sample—the rubber in sample No. 5 being rid of its insoluble matter only—it will be seen that the presence of Hevea resins has but little influence on the coefficient of vulcanization, for the case of sample No. 5 is practically the same as that of sample No. 17 which does not contain any resinous matter.

On the other hand the physical constants of the vulcanized products are a little diminished by the total absence of resinous matter in the rubber. As the vulcanized products, which are obtained from samples No. 12, 14, 15 and 17, are subjected to the action of aging, they deteriorate rapidly while the vulcanized products obtained from samples No. 13 and 1 do not change. The vulcanizates from samples No. 12, 14 and 17 soften up rapidly and the physical properties of the aged products resemble those of non-vulcanized rubber.

Vulcanization of Pure Rubber

The tests on rubber samples which are described above, the experiments performed with oxidized rubber and the rubber resins, confirm only incompletely the hypothesis which has been advanced by Weber and which connects the results of vulcanization with the presence of these substances in the rubber mixture. On the other hand, it confirms the truth of his observation on the fact that pure rubbers are non-vulcanizable without the presence of the resinous matter and other so-called impurities in the rubber mixture, as well as without the similar presence of additive matters, such as metallic oxides. As we have shown, the removal of the resinous matters increases the physical constants and only effects in a slight degree the coefficient of vulcanization.

Stevens just like Weber mentions the favorable effect of litharge on the vulcanization of virgin rubbers or pure gums, but these two investigators do not explain the role that is played by this substance. This is something incomprehensible to them.

If, however, the hypothesis is used which has just been developed in the case of the vulcanization of rubber, as described above, and if it is assumed that the action of the lead salt cannot take place except in the presence of colloidal sulphur, all these obscure facts become clear.

An Explanation Along These Lines

The insoluble matter, the proteins and the oxidized rubber, which are ingredients of the rubber mixture, are capable of causing the formation of sulphuretted hydrogen at a certain favorable temperature in the presence of polymerized sulphur, S_8. Sulphur dioxide gas is also formed in this reaction and the two gases, hydrogen sulphide and sulphur dioxide, then react on each other and the colloidal variety of sulphur, which is alone able to effect the vulcanization of the rubber, is produced.

It is only the resinous matter in the rubber that has the power of converting polymerized sulphur into sulphuretted hydrogen, which then reacts with the sulphur dioxide to give colloidal sulphur. The action of the air, which causes a decomposition of the sulphuretted hydrogen, also produces a small amount of colloidal sulphur. This phenomenon then explains the fact that when working with certain rubber gums which contain resinous matter and a little oxidized rubber as well, the coefficient of vulcanization is low and the physical properties of the vulcanized rubber are poor.

Now then if litharge is added to the rubber, it will react with the polymerized sulphur, resulting in the formation of sulphur dioxide. This in turn reacts with the sulphuretted hydrogen, which is formed in the first phase of the reaction and produces colloidal sulphur which then effects the vulcanization of the rubber.

Although the tests which were conducted by Weber and Stevens were instituted for solving entirely different problems confronting the investigators, nevertheless the results, that were obtained by them, seem to come to the aid of the vulcanization theory which has just been defined and in fact appear to corroborate the same.

Conclusion

The impurities that are present in the rubber, the litharge that is incorporated with the latter, show that these substances play an important role not alone in the vulcanization of the rubber itself, but also in the changes that take place in the vulcanizing agents to render them useful to the process; thus the polymerized inactive sulphur S_8 is converted into the active colloidal variety of sulphur. The whole secret of the action of these substances is found in this conversion.

Then to be sure at first glance it appears to be quite simple and logical to expect to find other similar materials which will have the same effect on the vulcanizing process as these substances. There should be many other substances which when used under carefully regulated and scientifically controlled conditions should give just as good if not better results. These substances should be able to change the inactive variety of sulphur into the active colloidal sulphur. This is the role of the accelerator of vulcanization.

The study of sulphur, which has been singularly neglected from the standpoint of the vulcanization of rubber, the study of the various substances that are added to the rubber, possessing either oxidizing or reducing properties and able to produce colloidal sulphur under the influence of heat, will undoubtedly afford the key to the explanation of the vulcanization of rubber and will permit the rubber man to work along scientific principles in the mill and replace the empirical methods that are and have been used up to the present day since rubber vulcanization was first discovered.

It is this study which the author has proposed to make and of which this chapter has been the introduction.

Many Products Exhibited at Brussels

Rubber Association of America Salons Aroused Great Interest—Other Countries Represented by Varied Exhibits

ALTHOUGH the trade did not consider the Sixth International Rubber Exhibition, which closed in Brussels on April 16, of equal interest to previous exhibitions, it attracted thousands of visitors who were moved by curiosity alone and doubtless was a great factor in stimulating renewed interest in rubber and its many applications.

Located in the Hall de Cinquantenaire and operated in conjunction with the Fifth Commercial Fair, the Exhibition was visited by rubber traders and manufacturers from every important rubber center in the world. They found much of interest in the many and varied exhibits, especially in those of the Rubber Association of America and the Rubber Growers' Association of London. However, by far the most extensive displays of manufactured rubber were those of Belgian manufacturers. Yet this fact did not denote the great importance of manufactures displayed, although it did give manufacturers from other countries an unexcelled opportunity to study Belgian rubber products and compare them with their own.

Rubber Association Exhibit

Without doubt one of the most attractive exhibits, reported P. L. Palmerton, was that of the Rubber Association of America, Inc. Aside from its attractiveness, the exhibit received considerable attention because at previous Exhibitions of the kind, little or no American rubber goods had been displayed. One American manufacturer of rubber sundries and specialties had an exhibit placed by its British distributor but all other American representation was centered in the Rubber Association of America section.

The space of the Rubber Association had been well chosen and comprised three salons which occupied a good part of a raised platform in the center of the Exhibition Hall. In the center of the Association's space was shown a wax figure of a Malayan tapping a rubber tree. The completeness of the scene, even to the flow of latex and the latex cup and can, gave it an educational value for the casual visitors and assisted in attracting a large number into the room. The primary purpose of the Association's exhibit was obviously that of impressing the visitors with the scope and size of the American rubber industry. The idea that the United States is the world's largest consumer of crude rubber and that the amount of crude rubber consumed in the United States is constantly increasing were forcibly expressed.

Showed Extent of Industry

A series of decorated and lettered wall panels gave figures relative to the operations of various branches of the American industry while others showed the relative standing of that industry with the rest of the world. The quantities of crude rubber, cotton and compounding ingredients consumed were represented graphically. The task of showing the size of the American rubber industry was aided through two other media, namely, a baloptican and a booklet. The baloptican was equipped with seventy slides, many of which were made from photographs of American rubber factories; others illustrated important uses of rubber products in American daily life. The booklet, which was distributed to visitors who showed an unusual interest in the exhibit, was entitled "The Rubber Industry of The United States" and was available in French as well as in English. It contained a number of short chapters with illustrations and charts, all of which contributed in giving expression to the ever increasing need for crude rubber in the United States.

In the first room of the Association's space was shown the raw materials commonly used in the rubber industry with appropriate cards to indicate how they contributed to the finished product. In this room were also shown the parts of a tire and a rubber shoe together with the finished products which could be made from the parts shown. The wall of this room, like the other two, was covered with appropriate decorative panels.

Tires, Mechanical Goods and Footwear

The main room of the Association's space was devoted to tires, mechanical rubber goods and footwear. Samples of different types of tires, from the bicycle tire to the airplane and 14-inch solid tire, were shown. In addition, a complete assortment of tire sections was displayed. The balloon tire sections attracted special attention. The mechanical rubber goods display was fairly complete, hose in particular being given ample representation. In this part of the exhibit were shown three plaques of rubber flooring and tiling which got much attention from the visitors. Likewise, the rubber footwear, which occupied another side of the main room, was examined with special care. The full range of canvas rubber-soled footwear and bathing slippers attracted much attention.

In the third salon, rubber sundries and specialties shared the space with the baloptican. In this room were also shown a number of rubber bumpers and spring shackles such as are coming into use on motor trucks in the United States.

None of the products shown in the Association's space were identified as to the individual factory from which it came, and all inquirers were referred to the Association or their names and connections were noted by the attendants on behalf of that organization. Factory names had been buffed from all the tires and in the case of other goods, names and trade marks had been cut away or covered with an Association seal.

The American rubber products compared favorably with any and all of the manufactured goods displayed by European companies. The finish of the American goods, particularly the footwear and the sundries, was much admired.

Exhibits of Belgian Manufacturers

Foremost among the Belgian displays was that of O. Englebert Fils & Cie., manufacturers of the Englebert tire. The main attraction of the Englebert exhibit was the balloon tire in the manufacture of which Englebert has followed Michelin as closely as possible. The three sizes of clincher balloon tires introduced by Michelin in 1923 were shown as well as the 31 x 4.40 clincher balloon tire for light cars which was put on the market only recently by Michelin. No other manufacturer at the Exhibition showed the 31 x 4.40 clincher balloon tire and there was some surprise that Englebert has gotten it on the market so quickly. The rest of the Englebert exhibit was taken up with bicycle and motorcycle tires, soles and heels, and molded specialties.

A large assortment of "Belgica" solid tires was shown by the Societe Liegeoise le Caoutchouc. This company also displayed a large line of waterproof garments which bore the trade mark "Belgica." Less important products of the company are rubber-covered pullies, radiator hose, and tubing.

One of the most complete of the manufacturers' exhibits was that of O. and R. Cheysen Freres & Cie. whose factory is near Brussels. The company offers a full range of cord tires for automobiles, motorcycles and bicycles, and makes a specialty of pneumatic tires for trucks and busses and several samples of these were shown accompanied by the Pare-Boues or "anti-splashers." The Pare-Boues are manufactured primarily for the Parisian market where a traffic law compels busses on pneumatics to be equipped with an anti-splash" device. Other goods manufactured and shown by the company comprised a full line of mechanical rubber goods and rubber soles and heels. A special feature is made of conveyor and elevator belting.

One of the younger Belgian rubber companies, known as Societe Belge du Caoutchouc Mousse, had a most interesting display of sponge rubber products which is all the company manufactures. The goods were advertised as being made of "Foam Rubber" and the company had attempted to broaden the range of products usually made of sponge rubber. One of the leading products is the sponge rubber play ball of which the company advertises an output of 22,000 per day. The Mousse balls are manufactured in ten sizes, having diameters of from 2 to 8 inches. They are supplied either with felted exteriors in bright colors, or enclosed in a silk net; the latter style appears to be extremely popular.

Other Uses of "Foam Rubber"

Other uses to which the "Foam Rubber" is being put include cushions in theater chairs, saddles, and athletic equipment such as cricket pads. The company's chief hope seems to lie in perfecting the sponge rubber as a filler for cycle and motor tires; they claim that recent experiments have proven so successful as to guarantee a future for the product in that direction. In the meantime, it is being used to an increasing extent in life belts, buoys, floats for various purposes and bath mats. The "Foam Rubber" is said to possess sound deadening and insulating qualities which are expected to make possible valuable applications of it in the building and electrical trades. It is also being used as a lining for aviators' suits.

National Union Rubber Company of Brussels-Forest had a display of their products but since their space was in conjunction with mechanical exhibits outside the hall in which the Rubber Exhibition was held, they put emphasis on their mechanical rubber goods, particularly hose. This company also manufactures the "Liberia" tire for automobiles, motorcycles and bicycles, and various molded rubber goods.

The manufacturers of the Jenatzy tire, who have their factory in the outskirts of Brussels, had a display in which the emphasis was given to the Jenatzy solid and pneumatic tires and carriage tiring. Several big pneumatics for busses were shown. Jenatzy balloon tires in the sizes originally introduced by Michelin are now available.

The Societe Anonyme Colonial Rubber of Ghent had an exhibit of "Colonial" pneumatic tires, mechanical rubber goods and hard rubber prducts. The hard rubber or ebonite goods of this company made an excellent appearance and attracted much attention. Other stands showed hard rubber to some extent but none of them approached Colonial in the finish given their products.

Societe Anonyme pour le Commerce and l'Industrie du Caoutchouc has factories in Brussels and Alost and exhibited samples of sundries and specialties, molded rubber goods and tubing. The color and finish of the sundries of this manufacturer is unusual. An exhibit of surgical tubing in various colors attracted much attention. The entire line of specialties including bathing caps, balloons, toys, etc. is well finished. The company's trade mark is "Sacie."

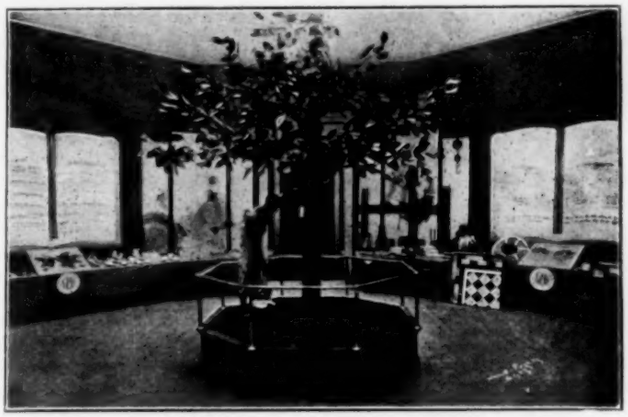
Extensive British Displays

The feature of the North British exhibit was the rubber floor covering which is sold under the name "Paraflor, and which is advertised as a logical substitute for linoleum. This covering is delivered in a variety of solid colors and marble effects, in width of 90 and 120 centimeters and in rolls up to 30 meters long. The thicknesses are 3 and 5 millimeters. The material was shown as used in covering floors, stairs, tables, etc. A line of floor mats of similar material was shown. The company makes a specialty of canvas rubber-soled footwear and showed a complete line. The J. G. Ingram Co., rubber sundry and specialty manufacturers, had an interesting exhibit. The completeness of the line and the finish of the goods was noteworthy.

The British Company—Pure Plantation Rubber Products, Ltd., of London—had on display a good part of the 1001 pure rubber products which they advertise; the major part of their attention was given to the crepe rubber sole. A large line of soles, half soles and heels were shown and offered for sale together with the cement for their application. Other products shown included mats, toys, sponges, brushes, bathing caps, pouches, tennis grips, bathing slippers and balloons.

A collection of British rubber goods was shown in the stand of the Rubber Growers' Association propaganda secretary. A good part of this display, however, was similar in tone to that of the Pure Plantation Rubber Products company as the aim has been to encourage new uses for rubber. The crepe sole was given most attention, along with a special cement for sole application.

In the Malayan exhibit appeared rubber products from the Singapore rubber factories. The principal showing was from the factory of Tan Kah Kee and comprised molded rubber goods for a variety of purposes but principally soles and heels and molded soles on canvas uppers. Automobile mats, balls and molded toys were shown but the canvas footwear line was easily the best of the collection.



The Rubber Age (London)

Tapping Scene in Rubber Association Space

The Space of the Rubber Association of America at the Brussels Exhibition Occupied Three Salons in which the Scene Illustrated Above Occupied A Prominent Place. The Completeness of the Scene Made it One of the Most Interesting Displays of the Entire Exhibition.

The second Singapore exhibit was from the factory of the Netherlands Gutta Percha Company, and comprised bicycle tires and tubes, hose in a fair variety, mats and other molded pieces.

A third display of manufactured goods coming from the countries of crude rubber production was that of the Fabrica de Artefactos de Borracha "Eureka" of Para, Brazil. The line of this factory is not so extensive as the two mentioned above, and includes only soles and heels and special molded pieces.

Ceylon was represented by a display of products made from crepe rubber on the plantations. These goods had been shaped from sheets of rubber, many of which were colored in the process of coagulation. The lack of even slight curing had been disastrous however, and most of the goods were misshapen, stiff and even unusable. The line included bathing shoes, bathing caps, mats and soles and heels.

The only other manufactured rubber goods at the Exhibit were those shown as prizes in a lottery which was conducted by a charitable organization, and two displays made by Brussels distributors, one of whom showed complete line of sundries and specialties (Comtoir Commercial Caoutchouc) and the other an attractive line of hard rubber parts for use in radio and electrical instruments.

The displays mentioned above gave the visitors to the Exhibition an opportunity to see the numerous uses to which rubber has been put and the high point to which its manufacture has been developed. In the absence of displays from France, Austria and Germany, however, there is no chance to form a completely settled idea of how the rubber industries of the various European countries compare. With the Exhibition held in Brussels, the comparatively small Belgian plants made a good showing, but the visitor really interested in the trade must have wished for a more complete range of manufactured goods from a greater number of countries.

Additional Papers Read at Brussels

Adjustment of Production and Consumption — Production of Sylvester in the French Colonies—Plantation Rubber for Soles

ABSTRACTS of several of the papers read at the International Rubber Conference held with the Sixth International Exhibition in Brussels could not be included in our last issue. These abstracts follow:

The Adjustment of Production and Consumption

By H. Eric Miller

The complexity of modern industry makes the adjustment of production to meet the varying needs of consumption a matter of great difficulty and it is generally assumed that concerted measures taken to assist this adjustment are designed to secure unwarranted profits to the producer at the expense of the consumer.

For many reasons these difficulties of adjustment are more pronounced in the case of rubber than in the case of many other important commodities. Five or six years must elapse between the planting of the rubber trees and the harvesting of the first commercial crop and another four or five years must pass before the trees become fully mature. Throughout all this period weeding and general upkeep of the estate must be rigorously carried out otherwise its value will rapidly depreciate. In very few of the important rubber producing districts is there any suitable indigenous labor and the coolies have to be recruited, in the case of Ceylon and Malaya, from South India and in the case of Sumatra, from Java. On account of the expense of recruitment, transportation from overseas, housing, medical treatment, training, etc. a large amount of expenditure is incurred by an estate in providing an efficient labor force; and this expenditure would be entirely wasted if the labor had to be disbanded; casual labor is of very little value to an estate.

Except for a short period in 1910, when owing to a relative shortage in shipping, speculation carried the price up to a fantastic figure, there has been an increasing supply of rubber to satisfy an increasing demand at a constantly diminishing cost—the result of large scale production. Up to the middle of 1920 the production was always slightly greater than the absorption (except during 1918 when there was a considerable excess) but the excess was no greater than was necessary to provide the increase in working stocks. In 1918, owing to the requisitioning of shipping for military purposes, imports into all the principal consuming countries were drastically curtailed which resulted in large quantities of rubber being accumulated in the Eastern ports.

While the possibility of an over supply was recognized in 1913 it was not till the end of 1917, and then, as pointed out above, only from causes arising out of the war, that the first attempt by the Rubber Growers' Association had to be made to adjust output to meet an artificially restricted demand. Their scheme was a voluntary agreement to reduce the production of rubber for the 1918 to 80% of the producer's previous maximum annual production with a minimum of 200 lbs. per acre. This scheme was adhered to by 75% of the acreage owned by the members of the Rubber Growers' Association in London, but local producers in Malaya, Ceylon and the Netherlands East Indies refused to cooperate and many of them increased their production. Nevertheless the restriction actually practised kept about 35,000 tons of rubber off the market. Negotiations were opened with the Government in the middle of 1918 to introduce compulsory restriction of output in the British Colonies but the advent of the Armistice completely changed the situation.

Difficulties again began to appear in the middle of 1920 accentuated by the development and increasing use of the "Cord" tire. The Council of the Rubber Growers' Association having warned the industry of the rapidly approaching crisis obtained the assent of over 95% of its membership to its second restriction scheme which was the voluntary reduction of each producer's output to 75% of the estimated normal output for the period 31st November, 1920, to 31st December, 1921. The scheme was also assented to by 70% of the Members of the International Association at the Hague and by a large proportion of the Ceylon and Malayan local producers.

The World monthly rate of absorption fell from 30,000 tons during the first half of the year to 20,000 tons during the second half and this together with 60,000 tons of actual over-production resulted in a surplus of 140,000 tons of rubber at the end of that year. The effect of the scheme combined with the steadily falling price of rubber was to reduce the output by over 25%; nevertheless the stocks of crude rubber increased by over 20,000 tons during that year.

Early in 1921, the planters in Malaya requested the Government to control output, but this was refused on the ground that the industry should work out its own salvation.

Throughout that year various schemes were considered, the most important being that of the Rubber Growers' Association to form a Producers' Corporation to regulate output and control price. None of these schemes succeeded in obtaining the necessary support, and a short-lived rise in price at the end of the year to 1/— per lb. was responsible for preventing the renewal of the restriction scheme which had been in force during 1921. Thereafter each producer settled his own output policy; many continued to restrict their output, but financial necessity compelled a large number to produce to the utmost of their capacity. More rubber was again being produced than the World could absorb and the price fell to a new low level of 6¾d per lb. in August, 1922.

The inability of the industry to work out its own salvation together with the serious economic condition of Malaya resulted in the appointment by the British Government of the Stevenson Committee to consider the situation. About the end of November, 1921, the Committee recommended a scheme to be enforced uniformly and simultaneously in Malaya, Ceylon and the Netherlands East Indies but in August, 1922, the Dutch definitely refused to cooperate. In the meantime a considerable and sustained improvement in the rubber manufacturing industry had taken place and on account of this the Stevenson Committee which had again been called together felt justified in recommending the compulsory adoption of its scheme in Malaya and Ceylon supported by the voluntary cooperation of the British estates in the Netherlands East Indies and elsewhere. This scheme was brought into operation on the 1st, November, 1922, and is being adhered to by about three-quarters of the plantation industry. During the first fifteen months of its existence the average price of rubber was about 1/3 per lb.—the pivotal price of the scheme, the World's free stocks were reduced by about 40,000 tons, no shortage of rubber has eventuated and the producing industry has been enabled to obtain a moderate profit. Had the scheme not been brought into existence the result would have been disastrous to the owners of estates.

Production of Sylvester and Plantation Rubber in the French Colonies

By Aug. Chevalier

Head of the Mission permanente d'agriculture Coloniale au Ministere des Colonies, Director of the Laboratories d'Agronomie Coloniale pres du Museum d'Histoire naturelle.

The paper opens with a sketch of the transition in the last few years from wild rubber to plantation rubber as the source of supply for the world's needs, and in the course of this sketch it is pointed out that in 1923 French industry absorbed 28,000 tons out of the total world production of 400,000 tons, and the belief is expressed that within a short time the Hevea

plantations of Indo-China will be able to produce about one-fourth of the quantity consumed by France.

In a recent essay the author, who for many years has travelled widely in the jungles and forests of French colonial possessions in Africa and Asia, has drawn attention to the remarkable progress in tropical agriculture which has resulted from the plantation of rubber trees on a large scale, and he devotes a great part of his present paper to showing what the consequences of that evolution have been as regards the French Colonies. The tapping of wild rubber has meant for Equatorial Africa hard and very badly-remunerated drudgery, and efforts to improve matters have not yielded the expected results. Trees cannot be preserved, or replaced when exhausted, and it has been found impossible to modify and improve the methods habitual among the tribes engaged in plucking in mid-forest and mid-jungle. The gathering of wild rubber in Equatorial Africa has not made for the progress of the country, and no attempt to organize the cultivation of Sylvester rubber seems to hold out any promise of success.

The author proceeds to give an account of the beginnings of the Hevea plantations in South Indo-China, and says that the results have been highly satisfactory. It is computed that on December 31st, 1923, these plantations, with those in the adjacent districts of Annam and Cambodge, covered 83,000 acres, in which area 4,437,000 trees were being tapped regularly. The success of the Malayan planters was a great stimulus to the French planters when they set out on their rubber-growing enterprises on a big scale in 1907. The coagulation of the latex is done in factories equipped with all the modern appliances, as on the large plantations of Malaya and Ceylon, and the methods of cultivation, selection of plants, and tapping customary in those countries have been adopted.

Pure Plantation Rubber for Soles

By A. Oliphant Devitt

Although one of the very earliest uses for rubber was in the making of footwear, the history of the plantation crepe rubber sole is a very short one, the first specimens having been introduced to the public in Britain as recently as 1921, when they were shown on the Ceylon stall at the International Rubber Exhibition at Islington, and attracted much attention. A member of an old-established firm of tennis shoe manufacturers realized the possibilities of the new material, and coached the author as to the peculiar requirements of users of various sorts of sports shoes. The author's firm sent circulars broadcast, and thus started a new use for rubber which is now making its way all over the world. Early difficulties in affixing the soles are described, as well as the difficulty of obtaining material of the required thickness and surface, and in regard to this the author says that after two-and-a-half years of hard work only about a dozen rubber estates are turning out material which can be described as A.1. The need for a standardized surface is emphasized.

Ordinary market crepe re-milled and built up into sheets of the necessary size and thickness for soles is serviceable in use, but it is not to be compared for wearing capabilities with the sheets made on the estates, and it is important that the two qualities should be known separately as "estate produced" and "re-made" and only sold as such.

The outlook for the future is encouraging. The output of soling crepe has increased from a few pairs of soles in 1921 to some 2,500 tons in 1923, all of which has been used up, and it is estimated that about 600 tons of the 1924 crop has already been sold. The large number of inquiries received from Europe as the result of a circular sent out recently by the Propaganda Department of the Rubber Growers' Association, and the great encouragement received by the secretary of that Department during his visit to America, point to the possibility of all present estimates of the quantity of rubber required for crepe soles being upset in the near future. At present all countries are interested in the matter. Regular shipments are going to every Continent; large contracts are expected from the British Government; several thousand pairs of crepe soles are being tested in the Swiss Army; and rubber-soled sandals for the teeming thousands in India, Japan, and China are more than an idle suggestion. In an appendix the author gives an exhaustive list of the various uses to which pure plantation crepe soles are already being put.

T-A-C-T

"Tact: what is it? Why is it? What relation, if any can it bear to the manufacture of rubber goods?" Such are the questions C. H. Oakley, president of the Essex Rubber Company, might have asked himself before calling in his ad-man and giving instructions which resulted in the preparation of a number of show-cards, bearing four letters, wide-spaced and spelling out the word "t–a–c–t."

One morning the cards appeared on shop bulletin boards and at time clocks. No explanation, no amplification, simply the white cardboard with the four letters spread across it—and immediately the factory began to talk, to ask questions, and to wonder what it was all about.

Then, when the placards had done their work of arousing interest, there appeared an offer open to all employes, in which prizes of five, three and two dollars were offered for the best expression of the basic idea conveyed by the word "tact." Three officials were named as judges, and no restrictions placed on the method whereby the meaning of the word was arrived at.

Naturally, Noah Webster and others of dictionary fame furnished the definition verbatim in a number of cases, but out of the 168 competitors were many who displayed originality, and still more who showed that the import of the word had been brought home to the writer much more effectively than would have been possible even through individual instruction on the part of the managemet. Of course, Webster was not eligible for a prize, and the three winning definitions were all couched in the language of the worker, and as such put their meaning across one hundred per cent effectively.

The three winning definitions were posted on the bulletin boards, and discussed and argued over with all the partizanship evoked by a horse race or a World's Series score.

On the surface, there was nothing back of Mr. Oakley's idea further than the addition of one word to the vocabulary of each man in the plant—but for a long time after the close of the contest the meaning, the message of *tact* was evident in the relation of one employe to another and in the contact between worker and those outside the organization.

As a means of smoothing out many a misunderstanding in its incipiency the contest without doubt has paid its cost many times over, and is still paying dividends on the original investment.

March Rubber Goods Exports Show Increase

Gain, Although Satisfactory is Seasonable and Makes Poor Showing when Compared with March, 1923 Figures

UNITED STATES' exports of rubber products were valued at $3,365,709 in March as compared with $3,027,840 in February, according to the Department of Commerce. This is a satisfactory but almost wholly seasonal increase, and the gain is much less than in 1923, when the value of exports advanced from $3,142,150 in February to $4,316,176 in March.

During March, 102,240 automobile casings were exported, an increase of 12,792 over February, but far below the March shipments for 1922 and 1923. Except for tires, export shipments this year are well in advance of those in 1923, and it is possible that recent tire price increases initiated by European competitors will enable American exporters to improve their position.

The leading markets for automobile casings during March were England, 20,826; Denmark, 9,550; Cuba, 8,703; Canada, 7,041; Argentina, 6,958; Japan, 6,611; Mexico, 4,098; Brazil, 3,844; the Philippine Islands, 3,355; Australia, 2,757; Sweden, 2,284; New Zealand, 2,069; and Norway, 2,020. There were 97,338 inner tubes exported, England taking 17,513, Cuba 14,310, Denmark 9,080, Argentina 7,060, Japan 6,501, and Mexico 4,954. The leading markets for the 11,247 solid tires shipped during March, were England, 2,779; Japan, 2,549; Australia, 1,268; the Philippine Islands, 906; Cuba, 764; and Canada, 534. The Japanese market, influenced by the fact that tires enter at lower rates than automobiles, continues to absorb relatively heavy tire shipments, a considerable share of which are for original equipment of American automobiles.

Mechanical Rubber Goods Shipments

Mechanical rubber goods exports increased over the preceding month, 311,758 pounds of rubber belting, 390,010 pounds of hose, and 173,069 pounds of packing making up the total. Chile took 88,740 pounds of belting, followed by Mexico, 50,629 pounds; Canada, 26,930; Australia, 21,469; Japan, 18,117; Brazil, 17,930; and England, 16,876. England was the leading market for rubber hose, taking 111,197 pounds, with Mexico, Cuba, Canada, Argentina, and the Straits Settlements ranging downward from 50,000 to 16,000 pounds. Canada, England, Mexico, Japan, and Cuba were the leading purchasers of rubber packing.

Exports of Rubber Boots and Shoes

The trade in rubber boots and shoes declined sharply during March, 19,628 pairs of rubber boots being exported as compared with 52,108 pairs in February, and 47,272 pairs of rubber shoes, compared with 88,986 pairs in February. This is a seasonal reaction in the trade, as export shipments of waterproof footwear are usually dull from March to June. England, Canada, and Newfoundland were the principal destinations of rubber boots; while Argentina, Japan, Canada, Chile, England, China, and the Philippine Islands each took between 8,000 and 2,000 pairs of rubber shoes. Canvas rubber-soled footwear shipments for the month amounted to 494,019 pairs, valued at $378,577, as compared with 318,216 pairs, valued at $257,386, in February. The leading markets were Cuba, 117,769 pairs; England, 103,291 pairs; the Philippines, 84,528 pairs; Mexico, 36,740 pairs; and Denmark, 35,411 pairs. Denmark has taken important shipments of canvas rubber-soled shoes in recent months and ranked seventh among American markets in 1923 March shipments to Argentina consisted of only 300 pairs, this being the offseason. There were 221,845 pounds of rubber soles and heels exported in March, 64,491 pounds going to the Philippines, 28,848 to Cuba, 25,874 to Argentina, 23,759 to Mexico, and 17,028 to Colombia.

The trade in rubber sundries and specialties continued brisk. The value of rubber toys, balls, and balloons exported during March was $80,244, England, Canada, and Cuba taking almost 70 per cent of the total. England, Canada, Japan, Denmark, France, and Scotland were the principal purchasers of the 29,403 dozen bathing caps exported during the month. It is probable that an important share of this trade is not given in the statistics owing to the large number of parcel post shipments valued at less than $25 per package which are not recorded. During March 11,272 water bottles and fountain syringes (the average unit value being $0.75) were exported, chiefly to Argentina, Canada, and New Zealand. The value of other druggists' rubber sundries exports was $63,519, England, Canada, Argentina, Cuba, Mexico, Sweden, Australia, Japan, and France being the leading markets in order of importance.

Canada Principal Market for Hard Rubber Goods

Canada was the destination of over 43 per cent of the March exports of hard rubber goods, which were valued at $88,164, and the United Kingdom accounted for 22 per cent; France and Sweden were also important markets. Exports of rubber thread amounted to 90,736 pounds in March as compared with 91,819 pounds in February, the value per pound being officially recorded as $1.075 in March. Reclaimed rubber, and scrap and old rubber were shipped in fair quantities, the price per pound of the reclaimed averaging $0.106, and of scrap and old rubber $0.043. The average price of reclaimed rubber exported in February was $0.116 and of scrap and old $0.040.

Exports of waterproofed auto cloth and rubberized fabrics amounted to 207,092 square yards, valued at $132,514; while the value of waterproofed clothing exported was $119,760. These values are not included in the total for rubber manufacturers, as some of the goods falling under these classifications contain no rubber whatsover. The principal markets for waterproofed auto cloth and rubberized fabrics were Canada, 77,532 square yards; Australia, 36,116; Argentina, 19,530; England, 16,776; and the Philippines, 12,779. Cuba took $46,008 worth of waterproofed clothing, the Philippines $29,339, Mexico $12,210, Newfoundland $8,764, Canada $5,592, and Uruguay $5,288.

Book Review

CHICLE AND CHEWING GUM. Trade Information Bulletin No. 197, Foodstuffs Division, U. S. Department of Commerce. By H. M. Hoar, Division of Research.

The chicle industry was begun on an outlay of $55, but in 1919 there were 57 factories in the United States engaged in the manufacture of chewing gum. At that time the cost of the materials entering into production was registered at $25,202,000.

Of special interest are the five pages devoted to the spruces and production. Chicle, the basis of American chewing gum, consists of the partially evaporated milky juice of the Achras sapota, an evergreen indigenous to Mexico, Central America, the adjacent South American republics, and the West Indies. But the bulk of the world's supply comes from Mexico and British Honduras; although in the last few years, owing to political disturbances in that country, attention has been turned away from Mexico to the South American product. The steps taken in collecting the juice of the sapota tree are described. Detailed description of the Mexico, Columbia, Venezuela, Guatemala, and British Honduras products also are given.

RUBBER STATISTICS

Import **Production** **Export**

Report of Inventory—Production—Domestic Shipments of Pneumatic Casings—Inner Tubes—Solid Tires

January, 1923 to March, 1924

"Production" and Shipment" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.
"Inventory" includes tires and tubes constituting domestic stock in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.
"Shipments" includes only stock forwarded to a *purchaser* and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

(Compiled by The Rubber Association of America, Inc.)

	PNEUMATIC CASINGS				INNER TUBES				SOLID TIRES			
MONTH	No. Mfrs. Reporting	Inventory	Production	Shipments	No. Mfrs. Reporting	Inventory	Production	Shipments	No. Mfrs. Reporting	Inventory	Production	Shipments
January, 1923	62	4,695,916	3,127,270	2,994,297	62	5,838,310	3,951,885	3,748,651	11	262,462	83,383	60,611
February, 1923	60	5,224,387	3,217,987	2,588,639	60	6,771,958	4,039,202	3,001,697	11	270,191	75,457	63,394
March, 1923	58	5,670,601	3,865,726	3,322,637	57	7,740,945	4,875,414	3,828,315	11	265,843	79,788	77,144
April, 1923	56	6,088,272	3,539,326	2,976,160	55	8,394,184	4,259,558	3,535,635	11	260,631	71,468	72,609
May, 1923	57	6,906,594	3,659,986	2,757,764	57	9,292,223	4,317,537	3,414,115	10	268,323	77,288	67,147
June, 1923	55	7,040,600	2,956,943	2,502,185	54	8924,326	3,590,011	3,581,060	10	283,425	72,445	52,126
July, 1923	54	6,471,124	1,992,989	2,534,425	52	7,396,444	2,625,118	3,942,247	10	263,891	42,345	45,219
August, 1923	58	6,058,387	2,355,915	2,807,432	53	6,950,578	3,577,922	4,304,034	10	262,810	48,141	45,925
September, 1923	60	5,397,557	2,029,581	2,623,775	55	6,457,455	3,254,575	3,683,514	10	249,379	37,074	45,971
October, 1923	59	4,876,352	2,361,340	2,819,583	55	6,898,425	3,855,244	3,595,737	10	234,945	37,285	48,065
November, 1923	55	4,689,329	2,399,725	2,456,296	53	6,693,639	3,451,716	3,422,426	11	213,686	32,577	49,471
December, 1923	51	4,329,300	2,437,148	2,603,617	52	6,318,446	3,288,665	3,497,472	10	178,088	34,937	62,408
January, 1924	56	4,808,084	3,220,292	2,785,335	51	6,720,247	3,887,959	3,475,713	10	182,782	53,604	43,375
February, 1924	55	5,265,133	3,278,674	2,801,000*	50	7,339,307	4,067,631	3,329,504	10	188,519	60,646	49,370
March, 1924	57	5,763,084	3,427,692	2,902,274	53	8,157,704	4,218,950	3,420,723	10	203,608	68,662	57,847

*Revised.

British Rubber Statistics

Movements of all kinds of Rubber to and from the United Kingdom as per Board of Trade Returns

March, 1924

IMPORTS

From	February			Two months ended FEBRUARY		
	1924	1923	1922	1924	1923	1922
Straits Settlements & F.M.S.	3,148	3,599	2,244	6,536	6,995	6,307
Ceylon and British India	1,477	1,594	1,469	2,616	3,043	2,940
Dutch East Indies, etc.	368	557	354	1,345	1,141	935
Brazil and Peru	427	440	319	778	945	630
Other Countries	259	92	22	419	186	117
Total Tons	5,679	6,282	4,408	11,694	12,310	10,929

EXPORTS

To	February			Two months ended FEBRUARY		
	1924	1923	1922	1924	1923	1922
United States of America	3,626	3,457	4,096	7,563	4,236	9,755
Canada	134	378	85	609	379	124
France	1,919	1,484	1,121	3,295	2,608	2,740
Belgium	211	175	135	348	293	229
Italy	476	342	136	813	689	324
Spain	38	35	73	62	62	120
Germany, Austria, Hungary	496	223	735	632	1,232	1,507
Russia	—	—	—	399	—	—
Sweden, Norway & Denmark	273	125	44	423	159	57
Other Countries in Europe	22	75	81	56	251	146
Other Countries	22	11	3	71	27	4
Total Tons	7,217	6,305	6,509	14,271	9,936	15,006

Landings, Deliveries and Stocks in London and Liverpool as returned by the Warehouses and Wharves during the month of February

	Landed for Feb.	Delivered for Feb.	Stocks 29th February		
			1924	1923	1922
London					
Plantation	4,481	5,202	56,391	70,234*	67,466
Other Grades	2	1	98	117	157
Liverpool					
Plantation	543†	871†	5,221†	7,323†	7,141†
Para and Peruvian	296	230	659	307	1,130
Other Grades	—	—	210	272	443
Total Tons London and Liverpool	5,322	6,304	62,579	78,253	76,337

†Official Returns from the six recognized Public Warehouses.
*Adjusted owing to stock-taking at various Wharves.

April, 1924

IMPORTS

From	March			Three months ended MARCH		
	1924	1923	1922	1924	1923	1922
Straits Settlements & F.M.S.	3,260	4,619	3,425	9,796	11,614	9,732
Ceylon and British India	1,191	1,319	1,148	3,807	4,362	4,088
Dutch East Indies, etc.	817	559	611	2,162	1,700	1,546
Brazil and Peru	361	230	168	1,139	1,175	798
Other Countries	186	215	45	605	401	162
Total Tons	5,815	6,942	5,397	17,509	19,252	16,326

EXPORTS

To	March			Three months ended MARCH		
	1924	1923	1922	1924	1923	1922
United States of America	2,613	4,095	1,634	10,176	8,331	11,389
Canada	492	328	61	1,101	707	185
France	1,431	1,265	1,344	4,726	3,873	4,084
Belgium	250	159	119	598	452	348
Italy	401	288	261	1,214	977	585
Spain	54	11	17	116	73	137
Germany, Austria, Hungary	685	490	1,038	1,317	1,722	2,545
Russia	—	—	—	399	—	—
Sweden, Norway & Denmark	65	90	70	488	249	127
Other Countries in Europe	76	65	181	132	316	327
Other Countries	47	18	26	118	45	30
Total Tons	6,114	6,809	4,751	20,385	16,745	19,757

Landings, Deliveries and Stocks in London and Liverpool as returned by the Warehouses and Wharves during the month of March

	Landed. for March	Delivered. for March	Stocks 31st March		
			1924	1923	1922
London					
Plantation	6,182	7,246	55,327	63,129	66,536
Other Grades	5	2	101	99	134
Liverpool					
Plantation	399†	508†	5,112†	6,627†	7,162†
Para and Peruvian	185	259	585	341	1,065
Other Grades	—	—	210	243	435
Total Tons London and Liverpool	6,771	8,015	61,335	70,439	75,332

†Official Return from the six recognized Public Warehouses.

MARKETS

Cottons and Fabrics

NEW YORK, May 15, 1924

Although the general undertone of the cotton market was fairly satisfactory during the past two weeks, reports of cold weather, rain damage, replanting and the ravages of the boll weevil were disturbing. Cotton rose on the 1st but broke the next day, with July leading. Fall River continued to be a wet blanket. Week after week sales there average around 30,000 bales—about one-fifth of the volume that could be called good.

During the week closing May 3 the world took 161,666 bales of cotton, against 157,624 bales last year. But the previous week it took 195,156 bales and two years ago in the same period took 234,017. Mill curtailment is reported to be gradually spreading in the South and New England. Exports were heavy, approximately 132,966 bales, which had a slight stimulating effect, that was only temporary.

Considerable short interest was evidenced in July both in New Orleans and New York and the firmness in which that position was held in Southern markets gave traders cause for anxiety. A report from the Rio Grande Valley where crops were at a fair stand had it that considerable boll weevil damage had been done.

Improved weather conditions influenced three Exchanges on the 5th. But during early trading that day smaller spot prices in Liverpool and a lower range of contract prices than any prevailing the previous week influenced our markets. Any gain made that day was lost the next in covering, brought about by a decidedly firmer market and an increase in spot sales.

Believing that curtailment of operations, either total or partial depending on localities and lines manufactured, must be expected, some traders anticipate that consumption figures for the balance of the season are almost certain to compare unfavorably with the corresponding months of last year. If heavy exports continue, however, the deficiency will undoubtedly be made up. When the European international political problems have been settled to some degree, which is expected this summer, it is hoped that business between this country and Europe will be done on a more liberal credit basis than has been possible for many years. In such a case takings would commence to increase almost immediately and it is reasonable to expect that a fairly large crop would be readily absorbed at full prices. A fair start has been made toward this crop but it can by no means be counted on.

Trading has been for the most part of a hesitant character owing to the condition of May and July due to a rapid decrease in certificated stocks in the large trading centers. Daily market reports have been rather tame with tarding restricted to the professionals and no great variance in fluctuations. An exception was noted on the 9th when a more definite value trend developed because traders became convinced that the new crop had received a setback as a result of the protracted cold weather.

A flurry on May 12 lifted May contracts to over $6 a bale in New Orleans. It was estimated that day that some 20,000 bales were taken about 2½ cents over July. More favorable temperatures in the cotton belt brought late months lower. The New York market for spots was steady but it declined 14 points in Liverpool to 17.48d for middling.

According to the Department of Commerce, Egyptian cotton exports for April totaled 44,581,000 pounds, as compared with 41,539,000 pounds for March. Arrivals for April amounted to 19,187,000 pounds and stocks at the end of the month totaled 120,017,000 pounds compared with figures for March of 19,591,000 pounds and 145,411,000 pounds, respectively.

Quotations of this date follow:

	Open.	High.	Low	Close Last	Close April 30
May	31.30	31.70	31.15	31.68	29.47
July	28.87	29.35	28.76	29.35	27.85
October	24.97	25.52	24.91	25.51	24.30
December	24.37	24.90	24.30	24.90	23.70

EXTRA STAPLE COTTON

Little change has been noted in quotations of extra staple cotton since our last report. Prices of strict middling in grade and color, f.o.b., New Bedford as of May 14 are as follows:

1 1-8-inch	32½ @ 33½	cents
1 3-16-inch	33½ @ 34¼	cents
1 1-4-inch	34½ @ 35½	cents
1 15-16-inch	36 @ —	cents

TIRE FABRICS

Most of the orders placed during the last two weeks have been small, although these were reported in fairly good distribution in lots from 500 to 5000 pounds. The largest order recorded in this market was for square-woven, placed at 55 cents for 100,000 pounds. Some business was done on an actual sales basis of 55c for carded American cords and 53c to 55c for square woven. Several contracts of moderate size were placed for cords and square woven for May, June and July delivery. Although tire manufacturers are undoubtedly in need of supplies, little interest is being shown by them in a concerted way. Inquiry is good, however. Inquiry was received from one of the large Akron companies for 500,000 pounds of square-woven. Later this order was reported placed "tentatively."

Quotations follow:

CORD FABRICS			
Combed Sakellarides		Nominal	
Combed Peeler	lb.	Nominal	
Carded Peeler	lb.	.55 @	.58
Combed Egyptian uppers	lb.	Nominal	
Carded Egyptian uppers	lb.	.62 @	.64

SQUARE WOVEN			
17¼-ounce Egyptian uppers, combed	lb.	Nominal	
17¼-ounce Egyptian uppers, carded	lb.	.60 @	.63
17¼-ounce Sakellarides, combed	lb.	Nominal	
17¼-ounce Peeler, carded	lb.	.54 @	.57

Ducks—Several small mills are reported to have stopped staple production but with others profits on specialty contracts are offsetting losses on the production of regular cotton ducks. Trading has been practically restricted to small lots. Maximum orders did not pass beyond 10,000 yards and in rare cases 20,000 yards. Small spot sales have been the feature of the market for the past two weeks and less interest is being shown in export business. All business done seemed to be for prompt or near future delivery.

Burlaps—The market for burlaps has been spotty. Moderate interest has been shown in spot lights and nearbys. A firm undertone was apparent and there were plenty of inquiries. Buyers, however, hesitate to place orders at current asking prices. Total East Coast and West Coast shipments were reported for April as 50,300,000 yards. The Calcutta market has been characterized by fluctuations of from 2d to 5d in various positions. Frequent advances of 5 points for May to September burlaps were recorded in New York.

SHEETINGS			
40-inch 2.50-yard	yd.	.16½ @	—
40-inch 2.85-yard	yd.	.14 @	.14¼
40-inch 3.15-yard	yd.	.14½ @	—
40-inch 3.60-yard	yd.	.12 @	.12¼
40-inch 3.75-yard	yd.	.10¾ @	.10⅞
40-inch 4.25-yard	yd.	.09¾ @	.09⅞

(Continued on Page 145)

COTTON CONSUMPTION IN APRIL

Figures of the Census Bureau issued recently give the cotton consumption in April as 480,010 bales of lint and 42,289 bales of linters which compares with consumption in March of 483,928 bales of lint and 41,030 bales of linters. In April, 1923, 576,514 bales of lint and 52,595 bales of linters were consumed. For the nine completed months of the cotton season, home spinners' takings have been 4,559,374 bales, against 5,040,004 last year.

Chemicals and Compounding Ingredients

THE INDUSTRIAL CHEMICAL MARKET—NEW YORK, May 15, 1924—Movements in the majority of industrial chemicals during the past two weeks have been routine only. Many factors are simply marking time. Others report a steady but fairly satisfactory demand. It is generally agreed that the market is slower in most lines than it has been for previous weeks. It is believed by some that the bottom has been reached in shading prices inasmuch as lowered quotations seem to have had little or no effect in influencing the volume of business. No radical changes in quotations are expected this summer but an improved tone is anticipated. Contract business already booked is keeping some producers busy. The best that can be said about the market is that it is spotty. The conservative buying policy apparent for some months continues.

ACCELERATORS

Organic			
Aldehyde ammonia, crystals	lb.	$ .90	@ .95
Aniline oil, drums	lb.	.17	@ .17½
Diphenylguanidine	lb.	1.05	@ 1.15
Excellerex,	lb.	.40	@ .45
Formaldehyde-Aniline	lb.	.42½	@ —
Hexamethylene-tetramine	lb.	.82	@ .85
Paraphenylenediamine	lb.	1.40	@ 1.50
Super-Sulphur No. 1	lb.	.50	@ .60
Super-Sulphur No. 2	lb.	.25	@ .35
Tetramethyl— Thiuramdisulphide	lb.	6.00	@ —
Thiocarbanilide, kegs	lb.	.26½	@ —
Vulcocene	lb.	.35	@ —
Inorganic			
Lead, sublimed blue	lb.	.12	@ —
Lead, white	lb.	.12¼	@ —
Litharge, domestic	lb.	.11½	@ —
Lime, Superfine	lb.	.02	@ .04
Magnesia, calcined, light,	lb.	.24	@ .26
extra light	lb.	.45	@ .60
heavy	lb.	.07	@ .07½

COLORS

Blacks			
Arrow "Aerfloted"	lb.	.09½	@ .10½
Bone Black	lb.	.05½	@ .07½
Carbon "	lb.	.09	@ .12
Drop "	lb.	.07½	@ .10
Ivory "	lb.	.15	@ .45
Lamp "	lb.	.12	@ .40
Micronex	lb.	.09	@ .14
Blues			
Cobalt	lb.	.21	@ .26
Prussian	lb.	.40	@ .43
Ultramarine	lb.	.08	@ .35
Browns			
Iron oxide	lb.	.04½	@ .05½
Sienna, Italian,	lb.	.06	@ .14½
Umber, Turkey,	lb.	.04	@ .04½
Vandyke, domestic	lb.	.03½	@ .04
Greens			
Chrome, light	lb.	.30	@ .31
medium	lb.	.18	@ .18½
dark	lb.	.18	@ .18½
Commercial	lb.	.10½	@ .11½
Reds			
Antimony crimson, 15/17 F.S.	lb.	.39	@ .55
sulphur free	lb.	.45	@ .60
golden, 15/17 F.S.	lb.	.18	@ —
calcium and sulphur free	lb.	.40	@ —
red sulph. 15-17 F.S.	lb.	.15	@ .16
Indian, English	lb.	.11	@ .12
Para toner	lb.	.95	@ 1.00
commercial	lb.	.15	@ .18
Red Oxide, reduced	lb.	.08	@ .12
pure	lb.	.12	@ .14
Toluidine toner	lb.	2.00	@ 2.10
Venetian red	lb.	.02	@ .05½
Vermillion, quicksilver, English	lb.	1.35	@ 1.45
domestic	lb.	.15	@ .25
Whites			
Albalith	lb.	.07	@ .07¼
Aluminum bronze	lb.	.55	@ .60
Lithopone Azolith	lb.	.06¼	@ .06¾
Zinc Oxide—American Process XX red	lb.	.07⅞	@ .08⅛
Kadox, black label, bags, cars		.11¾	@ .12
blue " " "		.10¾	@ .11
red " " "		.09¾	@ .10
American Azo: ZZZ (lead free)	lb.	.07¾	@ .08¼
ZZ (under 5 per cent leaded)	lb.	.07	@ .07½
Z (8-10 per cent leaded)	lb.	.06¾	@ .07¼
Zinc Oxide—French Process White seal	lb.	.12	@ —
Green seal	lb.	.10¾	@ —
Red seal	lb.	.09¾	@ —
Yellows			
Chrome, light		.18	@ .18½
dark and medium	lb.	.18	@ .18½
Cadmium Sulphide	lb.	1.65	@ 2.50
Ocher, French	lb.	.01¾	@ .03
domestic	lb.	.02	@ .02½

COMPOUNDING INGREDIENTS

Aluminum Flake	ton	25.00	@40.00
hydrate light	lb.	.17	@ .18
Ammonia carbonate,	lb.	.13	@ .14½
Asbestine	ton	13.50	@17.00
Barium carbonate,	ton	68.00	@70.00
Barium Dust	lb.	.05	@ .06
Barytes southern off-color,	ton	15.00	@18.00
Western prime white	ton	22.00	@23.00
Imported	ton	28.00	@33.00
Basofor	lb.	.04¼	@ —
Blanc fixe, dry f.o.b. works	lb.	.04	@ .04½
Carrara filler	lb.	.01½	@ .02
Chalk, precipitated, extra light	lb.	.04¼	@ .05
heavy	lb.	.03¼	@ .04
Clay, China, domestic,	ton	12.00	@15.00
Dixie	ton	22.00	@32.00
Blue Ridge	ton	12.00	@25.00
Fossil flour	lb.	.03	@ .05
Glues, extra white	lb.	.22	@ .30
medium white	lb.	.20	@ .26
cabinet	lb.	.18	@ .28
cabinet low grade	lb.	.15	@ .18
common bone	lb.	.11	@ .15
Graphite flake, bbls.	lb.	.06½	@ .12
amorphous	lb.	.04	@ .10
Infusorial earth, powdered	ton	60.00	@ —
bolted	ton	70.00	@ —
Liquid latex	gal.	1.25	@ 1.35
Magnesia, carbonate	lb.	.08¼	@ .08¾
Mica, powdered	lb.	.07	@ .15
Rotten Stone (powdered)	lb.	.02½	@ .04½
Soapstone, powdered	ton	15.00	@22.00
Starch, powdered	cwt.	3.27	@ 3.54
Talc, domestic	ton	15.00	@22.00
French	ton	20.00	@25.00
French, high grade	ton	40.00	@45.00
Italian	ton	50.00	@55.00
Terra Alba	cwt.	1.75	@ 1.90
Tripoli, white	lb.	.02	@ .02¼
Whiting, commercial	cwt.	.85	@ 1.15
domestic	cwt.	13.00	@15.00
gilder's bolted	cwt.	1.10	@ 1.20
English cliffstone	cwt.	1.50	@ —
Paris white American	cwt.	1.25	@ 1.50
Quaker	ton	13.00	@15.00
Sussex	ton	8.00	@16.00
Wood pulp XXX	ton	35.00	@ —
" " X	ton	25.00	@ —

MINERAL RUBBER

Genasco (factory)	ton	50.00	@52.00
Granulated M.R.	ton	50.00	@54.00
Hard hydrocarbon	ton	30.00	@40.00
Soft hydrocarbon	ton	30.00	@40.00
320/340 M. P. hydrocarbon (c. l. factory)	ton	45.00	@50.00
300/310 M. P. hydrocarbon (c.l. factory)	ton	40.00	@45.00
Synpro, granulated, M. R. (factory)	ton	55.00	@70.00

SOFTENERS

Acids			
Acetic, 28%	cwt.	3.12	@ 3.37
Cresylic, 97%	gal.	.65	@ .75
95%		.63	@ .70
Muriatic, 20%	cwt.	.90	@ 1.00
Nitric, 36 degrees	cwt.	4.25	@ 4.50
Sulphuric, 60 degrees	ton	10.00	@11.00
66 degrees	ton	14.00	@15.00
Tartaric, crystals	lb.	.30	@ —
Alkalies			
Caustic soda, 76%	cwt.	3.76	@ 3.91
Soda ash, 58%	cwt.	2.04	@ 2.19
Oils			
Castor, No. 3, bls.	lb.	.15½	@ —
Chinawood, bbls.	lb.	.14½	@ .16
Corn, crude, bbls.	lb.	.11	@ .11¼
refined	lb.	.12	@ —
Cottonseed, crude		8.12½	@ —
Glycerine,	lb.	.16	@ .16½
Linseed, domestic	gal.	.88	@ .89
Palm, Niger	lb.	.06½	@ .06¾
Lagos	lb.	.07½	@ .08
Peanut, domestic, crude	lb.	.12½	@ —
Petroleum, amber	lb.	.04¾	@ —
dark, amber	lb.	.04½	@ —
Pine, steam distilled	lb.	.60	@ .65
Rapeseed, refined	gal.	.85	@ .90
blown	gal.	1.00	@ 1.02
Rosin, first rectified	gal.	.42	@ .44
second rectified	gal.	.45	@ .47
Soya Bean		.12¼	@ .12½
Tar, commercial	gal.	.30	@ .32
Resins and Pitches			
Cumar resin, hard	lb.	.09	@ .10
soft	lb.	.09	@ .10
Parra M.R.	lb.	.06	@ .07
Tar Retort	bbl.	11.00	@11.50
kiln burned	bbl.	11.00	@11.50
Pitch, Burgundy	lb.	.05	@ .06
coal tar	gal.	.06	@ .08
pine	bbl.	5.50	@ 5.75
Rosin, grade K	bbl.	5.90	@ —
Shellac, fine orange	lb.	.58	@ .59
Solvents			
Acetone, drums	lb.	.15	@ —
Alcohol, denatured, No. 1 bbls.	gal.	.52½	@ .56½
Benzol, 90%	gal.	.23	@ —
pure		.24	@ .25
Carbon bisulphide	lb.	.06	@ .07
tetrachloride	lb.	.07¼	@ .08
Dimethylaniline	lb.	.36	@ .38
Motor gasoline, steel bbls.	gal.	.20	@ —
Naptha, V. M. & P.	gal.	.19	@ —
Toluene	gal.	.31	@ —
Turpentine, spirits	gal.	.89	@ .90
wood	gal.	.84	@ .85
Waxes			
Bayberry	lb.	.21	@ .22
Beeswax	lb.	.40	@ .42
Carnauba, No. 1	lb.	.38	@ .39
Ceresin, white	lb.	.10	@ .11
Montan, crude	lb.	.05½	@ .06
Ozokerite, black	lb.	.23	@ .24
green	lb.	.27	@ .28
Paraffine	lb.	.05¼	@ .05½
Sweet wax	lb.	.12	@ —

SUBSTITUTES

Black	lb.	.09	@ .14
White	lb.	.10	@ .16
Brown	lb.	.10	@ .15
Brown factice	lb.	.09	@ .16
White factice	lb.	.09	@ .15

VULCANIZING INGREDIENTS

Black hyposulphite	lb.	.17	@ .20
Sulphur Chloride (drums)	lb.	.06	@ .08
Sulphur flour Commercial bags,	cwt.	1.35	@ 1.70
" bbls.	cwt.	1.70	@ —
Superfine, bags,	cwt.	2.00	@ 2.40
" bbls.	cwt.	2.40	@ —
100% pure, refined, bags	cwt.	2.25	@ 2.55
bbls.	cwt.	2.50	@ —

Crude Rubber

NEW YORK, May 14, 1924

Some circles considered significant the announcement from Amsterdam that the Rubber Growers' Association was debating means of establishing a selling organization to market rubber on a co-operative basis for Dutch Indian planters. The Dutch believe that this plan would have more effect on price stabilization than the Stevenson because it is said that under the British restriction Singapore rubber is exported to the Dutch Indies to be reexported to Singapore. However, Dutch rubber men declared that such a selling bureau would not lead to either a monopoly or to prohibitive price levels.

Concerted efforts to discard the Stevenson plan and general liquidation in London tended to force prices down on May 2 a fraction of a pence in London and ½c a pound in New York. British growers in Malaya petitioned the Government for a revision of the restriction. It is believed not only in London but here that the British Government will eventually take steps to draw a new plan to replace the present one that is tacitly admitted wanting. A new effort on the part of the British to induce the Dutch to reconsider the Stevenson plan would not come as a surprise to many.

Prices held firm until the 5th when nearbys declined ¼c and forward positions ⅜c, reflecting a loss in London and an increase in the weekly stock return. A further price decline at the opening on the 6th carried the price to 21⅜c for ribbed smoked sheets but this grade was bid later at 21¾c, the previous close. Good volume of business was done at the lows. Shipments from Malaya for April totaled 20,000 tons against 24,000 for April, 1923. Shipments for the four months ended April 30 were 86,000 tons as compared with 90,000 tons for the same period last year.

At the close on the 7th ribbed smoked sheets were quoted 21⅝c; on the 8th, 21⅜c; on the 9th, 20¾c; but the long side got the market under their control on the 10th when helped by firmer London prices spot quotations, ribbed smoked sheets closed at 21¼c. But this improvement was short lived for a slight reaction in London sent prices down on the 12th from ⅜c to ¼c a pound and ribbed smoked sheets closed at 21.

On the 13th another decline in London sent prices down to 20¼c. Throughout the day this price gained little strength and at the close was only 20½c. Increased April arrivals and the price reduction of one of the largest Akron manufacturers in but two tire sizes were blamed for the London slump. Buyers found, nevertheless, that low prices on nearby positions did not represent rubber actually offered for sale. London closed at the lowest prices since restriction enactment—10¾d buyers, spot. Singapore also lost ¼d which brought the price to 10⅜d spot.

Stocks of tires are reported to be moving more freely due to the approach of the open car season but not as much as had been expected owing to the late spring. Manufactures have been taking an appreciable amount of rubber for May delivery.

When an old established dealing and importing firm in London failed new low levels were touched there, spot quotations going down to 10¼d. Spots closed at asking prices of 10¾d. New York reflected the weak market in London. It touched 19¾c and at the close had only risen ¼c to an asking quotation of 20c.

NEW YORK MARKET

Plantations—			
Ribbed Smoked Sheets:			
Spot	.20¼	@	—
May	.20¼	@	—
June	.20¼	@	—
July-September	.20½	@	—
Oct.-Dec.	.21	@	—
First Latex, crepe, spot	.21	@	—
Amber Crepe No. 1, spot	.24¼	@	—
" " No. 2,	.19¾	@	—
" " No. 3,	.19¼	@	—
" " No. 4,	.18¾	@	—
Brown Crepe, Rolled	.18¾	@	—
" " Clean, thin	.19½	@	—
" " Specky	.18¾	@	—
Scrap, Colombo No. 1	.15	@	—
Pontianac—			
Prime Pressed	.08	@	—
Palembang	.07	@	—
Bangermassin	.08	@	—
Sarawak	.06	@	—
Paras—			
Up-river Fine	.20	@	.20½
" Medium	.18	@	—
" Coarse	.14	@	—
Islands, fine	.17	@	—
" medium	.16	@	—
" coarse	.07	@	—
Cameta	.12	@	—
Madeira Fine	.22	@	—
Acre Bolivian, fine	.20½	@	—
Cut Beni Bolivian, fine	.12½	@	—
Tapajos, fine	.17	@	—
Xingu Ball	.12	@	—
Caucho Ball—			
Upper, shipment	.14½	@	—
Centrals—			
Central, scrap, prime	.15	@	—
Corinto, scrap	.15½	@	—
Esmeralda, sausage	.15½	@	—
Guayule, w and d	.24	@	—
Africans—			
Benguela, No. 1	.12	@	—
" No. 2	.11	@	—
Congo, upper, black	.19	@	—
" " red	.18½	@	—
Kassai, Prime Red	.17	@	—
Balata—			
Black, Columbia	.50	@	.52
" Cuidad	.67	@	.68
Surinam, sheet	.70	@	.71
Gutta Percha—			
Siak	.16	@	.16½
Red Macassar	2.80	@	3.00
Chicle—			
Mexican, Yucatan	.65	@	.67

LONDON MARKET

Standard Ribbed Smoked Sheets—	
Spot	10¾d
June	10⅞
July	11
July-Sept.	11⅛
Oct.-Dec.	11½

SINGAPORE MARKET

Standard Ribbed Smoked Sheets—	
Spot	10 d
June	10
July	10¼
July-Sept.	10¼
Oct.-Dec.	10⅜

Activities of the crude rubber market for the days when it touched new lows are given on Page 145.

Chemicals

Litharge—Business is holding up fairly well on contracts. Producers are optimistic. Prices are firm and unchanged at 11½c @ 15c depending on quantity.

Blanc Fixe—Although buyers lack confidence and a little softness has been manifested, quotations remain unchanged.

Carbon Black—As stocks are being depleted the market continues strong. In most cases current orders are being filled from direct production. Spot lots are offered from 12c to 16½c depending on quality and quantity.

Zinc Oxide—Inquiries continue for both domestic and imported. Spot quotations have shown little fluctuation.

Reclaimed Rubber

NEW YORK, May 15, 1924

A fair volume of business is being done by reclaimers, although few new contracts are reported. The renewed interest being manifested by the trade in rubber paving is expected to open a considerable outlet inasmuch as the formulas for both outdoor and indoor paving call for from 20 to 30 per cent of a good grade of reclaimed rubber. More interest has been and is being shown in reclaims than ever before in the history of the industry. Reclaimers are optimistic regarding the future but expect no radical change in volume of business for the summer. Quotations, with the exception of a few grades, are unchanged:

Floating Tube	.13½	@	.14
Friction	.19½	@	.20½
Boots and Shoes (unwashed)	.09½	@	.09¾
Boots and Shoes (washed)	.12½	@	.13
Mechanical	.09	@	.09½
Hose	.09½	@	.10
Tires, truck	.08	@	.08¼
Tires, auto, black	.08½	@	.09
Black (washed)	.10½	@	.10¾
White	.13½	@	.14
Dark Gray	.09¾	@	.10
Light Gray	.11	@	.11¼

Scrap Rubber

NEW YORK, May 15, 1924

Little new business is reported by dealers but a fairly satisfactory volume is being done on old contracts. Plenty of scrap rubber is being offered to dealers at tempting prices. The weak condition of the crude rubber market is to a degree reflected in this market. Quotations, however, show no radical changes and although the undertone of the market is weak, are expected to hold fairly firm throughout the remaining spring weeks. The late spring undoubtedly has not had a good influence. Quotations, F.O.B. New York are nominally as follows:

Auto tire peelings	.00½	@	.00⅝
Standard White auto ....ton	13.00	@	14.00
Mixed auto .....ton	9.00	@	10.00
Bicycle tires .....ton	6.00	@	7.00
Clean solid truck tires	.00½	@	.00⅝
Boots and shoes	.01⅝	@	.01¾
Arctics, untrimmed	.00⅝	@	.00¾
Arctics, trimmed	.00⅞	@	.01
Inner tubes, No. 1	.03⅝	@	.03½
Inner tubes, compounded	.01¾	@	.02
Inner tubes, red	.01⅝	@	.01⅞
Battery jars, clean hard rubber	.00⅞	@	.01
Air Brake Hose .....ton	10.00	@	11.00
Rubber Hose .....ton	7.00	@	8.00

Rubber Patents

APRIL 15, 1924

1,490,113. Valve structure for pneumatic tires. John Kelly and Charles Raymond, St. Louis, Mo.

1,490,142. Grip pad for steering-wheel rims. Selden L. Stone and Hugh B. Powell, Indianapolis, Ind.

1,490,296. Mat. Peter J. Swanson, Seattle, Wash., assignor to Tire Mat & Bi-Products Co., Seattle, Wash.

1,490,358. Treatment of Rubber. Ruben Zertuche, Washington, D. C., assignor to Secretary of War of the United States of America.

1,490,535. Elastic web. Thomas Moore, Westerly, R. I.

1,490,556. Spring Tire. Jacob A. Bradley, Milwaukee, Wis., assignor of one-half to Albert O. Anderson, Shawano, Wis.

1,490,614. Toy balloon. Harry A. Loomis, San Jose, Cal.

1,490,618. Clamp for hose and flexible tubing. Albert McKinney, West Frankfort, Ill.

1,490,628. Pneumatic-tire valve. Frederick Myers, New York, N. Y.

1,490,648. Pneumatic tire. Charles Watkins Turner, London, Eng.

1,490,670. Valve-core tester. Paul J. Law, Perry, Iowa.

1,490,680. Wrapping machine. John Scherner, Cudahy, Wis. and Edward Hutchens, Eau Claire, Wis., assignors to Pierce Wrapping Machine Co., Chicago, Ill.

1,490,691. Machine for trimming rubber heels. Rees Beynon, Chicago, Ill., assignor to Dryden Rubber Co., Ill.

1,490,703. Rubber composition. Karl Barre Lamb, New York, N. Y.

1,490,760. Hose connection. Lee J. Black, Beaumont, Tex.

1,490,797. Rubber heel. Elmer W. Borger, Palmerton, Pa.

1,490,895. Tire-opening machine. William H. Gerstenslager, Akron, Ohio, assignor to the Goodyear Tire & Rubber Co., Akron, Ohio.

1,490,899. Tire-testing dynamometer. Carl F. Scott, Yonkers, N. Y., assignor to General Electric Co., Schenectady, N. Y.

APRIL 22, 1924

1,490,926. Detachable brake lining. Harry W. Jockers, Jenkintown, and Harry Jefferson, Philadelphia, Pa.

1,490,963. Rubber sole. Louis Colella, Detroit, Mich.

1,491,020. Tire-shaping press. Adrian O. Abbott, Jr., Detroit, Mich., assignor to Morgan & Wright, Detroit, Mich.

1,491,065. Method and tool for lap-seaming rubber goods. Chester J. Randall, Naugatuck, Conn., assignor to the Goodyear's Metallic Shoe Co., Conn.

1,491,136. Tire patch. Roy Durossette, Richards, Mo.

1,491,282. Apparatus for supplying stock to tire builders. Adrian O. Abbott, Jr. and Clyde J. Smith, Detroit, Mich., assignors to Morgan & Wright.

1,491,504. Tire. James H. Williams, Gilbert, Alberta, Canada.

1,491,550. Rubber heel. George Ross, Lorain, Ohio.

1,491,551. Tire cover. Orrin M. Sala, Canton, Ohio, assignor to the Gilliam Manufacturing Co., Canton, Ohio.

1,491,569. Rubber tire manufacture. Kenworthy J. Thompson, Mansfield, Ohio.

1,491,626. Method of making bead cables for tires. Alphonso Comstock Pratt, Deep river, Conn., assignor by mesne assignments, to American Chain Co., Inc.

1,491,674. Sanitary mask. Cataldo Coletti, Olean, N. Y.

1,491,683. Pressure gauge for automobile tires. Henry T. Donnell, Washington, D. C.

1,491,748. Auto rim. Larkin N. Hill, Atlanta, Ga.

APRIL 29, 1924

1,491,782. Protective Case for Explosive Containers. John William Ballew, Tulsa, Okla., assignor to Revere Rubber Co., Chelsea, Mass.

1,491,864. Pneumatic Vehicle Tire. John A. Johnson, Indianapolis, Ind.

1,491,877. Tire Protector. Richard J. Netzel and William H. Eynon, Cleveland, Ohio, assignors to Standard Tire Protector Co., Cleveland, Ohio.

1,492,064. Tire. Rollo C. Barker, Hayden, Ariz.

1,492,148. Inner Tube. Nathaniel G. Warth, Columbus, Ohio.

1,492,175. Pneumatic Tire for Vehicles. Robert W. Miller, Wilmington, Del.

1,492,218. Inner Tube for Pneumatic Tires. John D. Prince, Boston, Mass.

1,492,231. Regulable Cushion Truck Tire. Nathaniel G. Warth, Gallipolis, Ohio.

1,492,256 Resilient Tire. Harvey F. Maranville, Akron, Ohio, assignor by mesne assignments, to Firestone Tire & Rubber Co., Akron, Ohio.

CRUDE TOUCHES NEW LOW

New York, May 20, 1924

On May 19 ribbed smoked sheets touched 17 3-8—the lowest price since February, 1922. Many opinions were advanced by brokers to explain the downward trend of prices, none of which offered a logical reason for the condition of the market. Some declared that the drop was to be expected as there had been a large speculative long interest which matured this month. Others halfheartedly and perhaps disgustedly pointed to the bearish attitude of several New York brokers who offered the whole list on every bid made.

It is likely that within the next six weeks rubber will touch the lowest price in 15 years. Price rallied today to 18 1-4, then a reaction sent it down to 17 3-4 at which it closed.

1,492,203. Detachable Rubber Heel. William A. Maloney, Newton, Mass.

1,492,374. Pneumatic Wheel. George Jacobs, Detroit, Mich.

1,492,509. Sectional Tire. Albert S. Brown, Omaha, Neb.

MAY 6, 1924

1,492,835. Demountable rim. Charles E. Crownover, Yakima, Wash.

1,492,849. Wheel tire. Arthur O. Hubbard, Minneapolis, Minn.

1,492,906. Method and means for remolding hard rubber water-meter discs to precise dimensions. John Thomson, Brooklyn, N. Y.

1,493,029. Machine for coating material. Robert P. Frye, Marlboro, Mass.

1,493,062. Soft-rubber product and method of making it. Edward O. Benjamin, Newark, N. J.

1,493,068. Tire-fabric-building machine. Louis P. Destribats, Trenton, N. J.

1,493,153. Tire tool. Frank R. Hartsock, Warsaw, Ind., assignor of one-third to Charles O. Dickey and one-third to Leonard E. Dickey, both of Warsaw, Ind.

1,493,190. Cushion tire. Laurence R. Davis, New York, N. Y., assignor to Morgan & Wright, Detroit, Mich.

1,493,198. Resilient wheel. Ernest A. Havens, Peoria, Ill., assignor of one-fourth to Frank P. Casey, one-fourth to Herman H. Ashenberg, both of Peoria, Ill., and one-fourth to Norman T. Nichols, New Canton, Ill.

1,493,199. Resilient wheel. Ernest A. Havens, Peoria, Ill., assignor of one-fourth to Frank P. Casey, one-fourth to Herman H. Ashenberg, both of Peoria, Ill. and one-fourth to Norman T. Nichols, New Canton, Ill.

1,493,293. Air valve. Paul J. Timberlake, Jackson, Mich.

1,493,370. Method of making and vulcanizing dipped rubber articles. Thomas W. Miller, Ashland, Ohio.

New Incorporations

DELAWARE

Ohio Indiana Rubber Corp. $2,600,000. Crude and manufactured rubber. Incorporator, M. M. Lucey. Principal office, Wilmington, Del.

KENTUCKY

Bartling Tire & Rubber Co. $300,000. Incorporators, Edward F. Bartling, Doris M. Hoppe and Charles V. Williams. Principal office, Louisville, Ky.

NEW YORK

Serber Rubber Co. $20,000. Tires. Incorporators, S. Anhalt, L. W. Stern, N. M. Satloff. Principal office, New York, N. Y.

OHIO

Brunswick Tire Corp. $100,000. F. C. Van Cleef secretary of the B. F. Goodrich Co., secretary; B. E. Bensinger, of Chicago, president. Principal office, 1925 S. Michigan Ave., Chicago, Ill.

Paramon Rubber Manufacturing Co. $50,000. Manufacture and sale of rubberized aprons, garments and other fabrics. Incorporators, Arthur W. Pharis, Peter C. Mooney, J. Earl Cox, John McIntosh, M. S. DeForrest, all of Akron, Ohio. Principal office, Akron, Ohio.

Cotton Markets

(Continued from Page 142)

DUCKS

Belting	lb.	.46	@	.48
Hose	lb.	.46	@	.48
Enameling	lb.	.47	@	.52
Shoe Ducks	lb.	.48	@	.52
Single filling		.21½	@	.23½
Double filling	lb.	.24	@	.25½

BURLAPS
(Carload Lots)

7½-ounce 40-inch		5.65	@	5.70
8 -ounce 40-inch		5.70	@	5.75
10 -ounce 40-inch		7.60	@	7.70
10½-ounce 40-inch		7.75	@	7.80

DRILLS

37-inch 2.75-yard	yd.	.14¼	@	—
37-inch 3.00-yard	yd.	.13½	@	—
37-inch 3.25-yard	yd.	.12¾	@	—
37-inch 3.50-yard	yd.	.12	@	.12¼
37-inch 3.95-yard	yd.	.10¼	@	—

OSNABURGS

30-inch 7-ounce		.14½	@	.15
40-inch 7-ounce		.16¼	@	.16¾

Trade Marks

April 29

Subject to opposition within 30 days of above date

ARCHCONFORMER—No. 156,802. Thomas G. Plant Co., Boston, Mass. Boots, shoes, and slippers of leather, rubber, felt, etc.

DESIGN (consisting of the letter "V" and an American soldier)—No. 185,273. Victor Novelty Mfg. Co., Ashland, Ohio. Basket balls, toy balls, rubber balls, playballs, and swimming belts.

DESIGN (consisting of a geometrical figure containing the word "United.")—No. 188,318. Miller Bros. Star Shoe Co., doing business as the Miller United Shoe Stores Co., Cleveland, Ohio. Leather and rubber boots and shoes.

RED MAN—No. 191,467. American Hard Rubber Co., Hempstead and New York, N. Y. Hard-rubber combs for dressing and cleaning the hair.

Not subject to opposition

GARLOCK STYLE No. 19—No. 183,512. Garlock Packing Co., Palmyra, N. Y. Packing and packing material made wholly of or from various combinations of asbestos, rubber, cotton, flax, copper, lead, iron and babbitt.

GARLOCK STYLE No. 22—No. 183,513. Garlock Packing Co., Palmyra, N. Y. Packing and packing material made wholly of or from various combinations of asbestos, rubber, cotton, flax, copper, lead, iron and babbitt.

GARLOCK STYLE No. 24—No. 183,514. Garlock Packing Co., Palmyra, N. Y. Packing and packing material made wholly of or from various combinations of asbestos, rubber, cotton, flax, copper, lead, iron and babbitt.

GARLOCK STYLE No. 150—No. 183,515. Garlock Packing Co., Palmyra, N. Y. Packing and packing material made wholly of or from various combinations of asbestos, rubber, cotton, flax, copper, lead, iron and babbitt.

GARLOCK STYLE No. 243—No. 183,516. Garlock Packing Co., Palmyra, N. Y. Packing and packing material made wholly of or from various combinations of asbestos, rubber, cotton, flax, copper, lead, iron and babbitt.

GARLOCK STYLE No. 900—No. 183,517. Garlock Packing Co., Palmyra, N. Y. Packing and packing material made wholly of or from various combinations of asbestos, rubber, cotton, flax, copper, lead, iron and babbitt.

GARLOCK STYLE No. 901—No. 183,518. Garlock Packing Co., Palmyra, N. Y. Packing and packing material made wholly of or from various combinations of asbestos, rubber, cotton, flax, copper, lead, iron and babbitt.

GARLOCK STYLE No. 44—No. 183,519. Garlock Packing Co., Palmyra, N. Y. Packing and packing material made wholly of or from various combinations of asbestos, rubber, cotton, flax, copper, lead, iron and babbitt.

GARLOCK STYLE No. 666—No. 183,520. Garlock Packing Co., Palmyra, N. Y. Packing and packing material made wholly of or from various combinations of asbestos, rubber, cotton, flax, copper, lead, iron and babbitt.

GARLOCK STYLE No. 720—No. 183,521. Garlock Packing Co., Palmyra, N. Y. Packing and packing material made wholly of or from various combinations of asbestos, rubber, cotton, flax, copper, lead, iron and babbitt.

SAFETY CUSHION—No. 183,532. O'Sullivan Rubber Co., Inc., New York, N. Y. Rubber heels for boots and shoes.

GARLOCK STYLE No. 17—No. 183,550—Garlock Packing Co., Palmyra, N. Y. Packing and packing material made wholly of or from various combinations of asbestos, rubber, cotton, flax, copper, lead, iron and babbitt.

THE RUBBER AGE BUYERS GUIDE

ACCELERATORS
Dovan Chemical Corp., New York.
Grasselli Chemical Co., New York.
Harshaw, Fuller & Goodwin Co., The, Cleveland, O.
National Aniline & Chemical Co., Inc., New York.
Roessler & Hasslacher Chemical Co., New York.
Rubber Service Laboratories Co., The, Akron, O.
Vanderbilt, R. T. Co., Inc., New York.
Wishnick-Tumpeer Chemical Co., Chicago.

ACCUMULATORS
Adamson Machine Co., Akron, O.
Akron Rubber Mold & Machine Co., Akron, O.
Allen Machine Co., Erie, Pa.
Birmingham Iron Foundry, Derby, Conn.

ACIDS
Harshaw, Fuller & Goodwin Co., The, Cleveland, O.
New Jersey Zinc Co., N. Y. City.
Wishnick-Tumpeer Chemical Co., Chicago.

ACID TANKS
Birmingham Iron Foundry, Derby, Conn.
Devine, J. P., Co., Buffalo, N. Y.
Farrel Foundry & Machine Co., Ansonia, Conn.

AIR & STEAM METAL BAGS
Allsteel Ridewell Tire & Rubber Co., Dayton, Ohio.

AIR BRAKE HOSE
United States Rubber Co., New York.

AIR GOODS
Davol Rubber Co., Providence, R. I.
Hodgman Rubber Co., N. Y. City.
United States Rubber Co., New York.

AIR MATTRESSES
Davol Rubber Co., Providence, R. I.
Hodgman Rubber Co., N. Y. City.
United States Rubber Co., New York.

AIRPLANE AND BALLOON CLOTHS
Hodgman Rubber Co., N. Y. City.
United States Rubber Co., New York.

ALBA WHITING
Harshaw, Fuller & Goodwin Co., The, Cleveland, O.
Industrial Chemical Co., New York.
Wishnick-Tumpeer Chemical Co., Chicago.

ALCOHOL
Harshaw, Fuller & Goodwin Co., The, Cleveland, O.
Wishnick-Tumpeer Chemical Co., Chicago.

ALUMINUM FILLER
Wishnick-Tumpeer Chemical Co., Chicago

ALUMINUM FLAKE
Aluminum Flake Co., Akron, Ohio.
Butcher, L. H., Co., New York.
Fulper, Edward B., Trenton, N. J.
Harshaw, Fuller & Goodwin Co., The, Cleveland, O.
Rubber Service Laboratories Co., The, Akron, O.

AMMONIA AQUA
Laidlow, Kelly & Co., New York.
Wishnick-Tumpeer Chemical Co., Chicago.

ANGLE THERMOMETERS
Taylor Instrument Companies, Rochester, N. Y.

ANILINE OIL
Butcher, L. H., Co., New York.
Fulper, Edward B., Trenton, N. J.
Klipstein, A., & Co., New York.
National Aniline & Chemical Co., Inc., New York.
Wishnick-Tumpeer Chemical Co., Chicago.

ANILINE OIL PLANTS
Devine, J. P., Co., Buffalo, N. Y.

ANTIMONY, SULPHURETS
Bullock, E. L., & Sons, Inc., New York.
Butcher, L. H., Co., New York.
Fulper, Edward B., Trenton, N. J.
Harshaw, Fuller & Goodwin Co., The, Cleveland, O.
States Metals Co., Inc., New York.
Rare Metal Products Co., Belleville, N. J.
Richo Manufacturing Co., Utica, N. Y.
Wishnick-Tumpeer Chemical Co., Chicago.

APRONS—RUBBER
Faultless Rubber Co., Ashland, Ohio.
Hodgman Rubber Co., N. Y. City.
I. B. Kleinert Rubber Co., N. Y. City.
Miller Rubber Co., Akron, Ohio.

ARTIFICIAL RUBBER
Carter Bell Mfg. Co., New York.
Everease Co., Wilton, Conn.
Stamford Rubber Supply Co., Stamford, Conn.

ASBESTINE
Butcher, L. H., Co., New York.
Fulper, Edward B., Trenton, N. J.
Harshaw, Fuller & Goodwin Co., The, Cleveland, O.
Wishnick-Tumpeer Chemical Co., Chicago.

ATOMIZERS
The Rubber Products Co., Barberton, Ohio.

AUTOCLAVES
Devine, J. P., Co., Buffalo, N. Y.

AUTOMOBILE COATS
Hodgman Rubber Co., N. Y. City.
United States Rubber Co., New York.

AUTO TOP FABRICS
Hodgman Rubber Co., N. Y. City.
Taylor, Armitage & Eagles, Inc., New York.
Turner, Co., J. Spencer, New York.
United States Rubber Co., New York.

BALATA
Wood, Charles E., New York.

BALATA FILM (Colorless)
Peters Bros. Rubber Co., N. Y.

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